DOCUMENT RESUME

ED 480 289 EC 309 787

AUTHOR	Hebert, Thomas P.; Cramond, Bonnie; Neumeister, Kristie L. Speirs; Millar, Garnet; Silvian, Alice F.
TITLE	E. Paul Torrance: His Life, Accomplishments, and Legacy. Research Monograph Series.
INSTITUTION	National Research Center on the Gifted and Talented, Storrs, CT.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
REPORT NO	RM02152
PUB DATE	2002-02-00
NOTE	47p.
CONTRACT	R206R000001
AVAILABLE FROM	Order Department, University of Connecticut, The National Research Center on the Gifted and Talented, 2131 Hillside Road Unit 3007, Storrs, CT 06269-3007 ($10). Tel: 860-486-0283; Fax: 860-486-2900; Web site: http://www.gifted.uconn.edu.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	EDRS Price MF01/PC02 Plus Postage.
DESCRIPTORS	Academic Achievement; Creative Development; Creative Teaching; *Creative Thinking; *Creativity; *Creativity Research; *Creativity Tests; Educational Development; Elementary Secondary Education; *Gifted; Life Events; Mentors; Postsecondary Education; Professional Development; *Scholarship; Talent Development
IDENTIFIERS	*Torrance (E Paul); *Torrance Tests of Creative Thinking

ABSTRACT

This monograph is designed to be a tribute to E. Paul Torrance, a renowned creativity researcher, university teacher, and mentor. It is presented in three sections, the first of which is a discussion of Torrance's life. It reviews his childhood in rural Georgia, his academic accomplishments, the emergence of his interest in creativity and the development of his creativity theory, the application of his creativity theory, and his affirmation of creativity in challenging times during his retirement years. The second section of the monograph provides an overview of Torrance's accomplishments, including his creativity research, the design and refinement of the Torrance Tests of Creative Thinking (TTCT) to measure creative abilities, results of his longitudinal studies on creativity, the development of the Future Problem Solving Program, and the development of the Incubation Model for creative teaching. The monograph states that the TTCT has been used in more than 2,000 studies and has been translated into more than 32 languages, and explains the components of the TTCT, scoring, and interpretation of the TTCT. The monograph concludes with a discussion of his legacy and the Torrance Center for Creative Studies. Testimonies of former students on Torrance's mentorship and inspirational leadership are included. (Contains 47 references.) (CR)

Reproductions supplied by EDRS are the best that can be made
from the original document.

NRC
G/T

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
E. J. Gubbins
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
1

ED 480 289

THE NATIONAL RESEARCH CENTER ON THE GIFTED AND TALENTED

University of Connecticut
University of Virginia
Yale University

E. Paul Torrance: His Life, Accomplishments, and Legacy

Thomas P. Hébert
Bonnie Cramond
Kristie L. Speirs Neumeister
University of Georgia
Athens, Georgia

Garnet Millar
Educational Consultant
Edmonton, Canada

Alice F. Silvian
South Carolina Partnership for
Distance Education
Columbia, South Carolina

February 2002
RM02152

EC 309787

BEST COPY AVAILABLE

E. Paul Torrance:
His Life, Accomplishments, and Legacy

Thomas P. Hébert
Bonnie Cramond
Kristie L. Speirs Neumeister
University of Georgia
Athens, Georgia

Garnet Millar
Educational Consultant
Edmonton, Canada

Alice F. Silvian
South Carolina Partnership for Distance Education
Columbia, South Carolina

February 2002
RM02152

THE NATIONAL RESEARCH CENTER ON THE GIFTED AND TALENTED

The National Research Center on the Gifted and Talented (NRC/GT) is funded under the Jacob K. Javits Gifted and Talented Students Education Act, Office of Educational Research and Improvement, United States Department of Education.

The Directorate of the NRC/GT serves as an administrative and a research unit and is located at the University of Connecticut.

The participating universities include the University of Virginia and Yale University, as well as a research unit at the University of Connecticut.

University of Connecticut
Dr. Joseph S. Renzulli, Director
Dr. E. Jean Gubbins, Associate Director
Dr. Sally M. Reis, Associate Director

University of Virginia
Dr. Carolyn M. Callahan, Associate Director

Yale University
Dr. Robert J. Sternberg, Associate Director

Copies of this report are available from:
NRC/GT
University of Connecticut
2131 Hillside Road Unit 3007
Storrs, CT 06269-3007

Visit us on the web at:
www.gifted.uconn.edu

The work reported herein was supported under the Educational Research and Development Centers Program, PR/Award Number R206R000001, as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this report do not reflect the position or policies of the National Institute on the Education of At-Risk Students, the Office of Educational Research and Improvement, or the U.S. Department of Education.

Note to Readers...

All papers by The National Research Center on the Gifted and Talented may be reproduced in their entirety or in sections. All reproductions, whether in part or whole, should include the following statement:

The work reported herein was supported under the Educational Research and Development Centers Program, PR/Award Number R206R000001, as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this report do not reflect the position or policies of the National Institute on the Education of At-Risk Students, the Office of Educational Research and Improvement, or the U.S. Department of Education.

This document has been reproduced with the permission of The National Research Center on the Gifted and Talented.

If sections of the papers are printed in other publications, please forward a copy to:

The National Research Center on the Gifted and Talented
University of Connecticut
2131 Hillside Road Unit 3007
Storrs, CT 06269-3007

Please Note: Papers may not be reproduced by means of electronic media.

About the Authors....

Dr. Thomas P. Hébert is an Associate Professor of Educational Psychology—Gifted and Creative Education at the University of Georgia in Athens, where he teaches graduate courses in gifted and creative education, and qualitative research methods. He is a Research Fellow with the Torrance Center for Creative Studies. His research interests include social and emotional development of gifted students, underachievement, mentoring, and counseling needs of gifted males. He is the recipient of the National Association of Gifted Children's 2000 Early Scholar Award, and serves as Governor-at-Large for The Association for the Gifted (TAG) Board, Council for Exceptional Children Board.

Dr. Bonnie Cramond is an Associate Professor of Gifted and Creative Education and the Graduate Coordinator in the Department of Educational Psychology at the University of Georgia in Athens. In addition, she is a Research Fellow with the Torrance Center for Creative Studies, an editor of the *Journal of Secondary Gifted Education*, and on the editorial board of several other journals. Dr. Cramond has had experience teaching and parenting gifted and creative education, has published papers, chapters, and a book on giftedness and creativity, and has presented at local, national, and international conferences. Her research interests are in creativity assessment, ADHD, and the nurturance of creative abilities in children.

Kristie L. Speirs Neumeister is a doctoral candidate in Educational Psychology, Gifted and Creative Education, at the University of Georgia in Athens. Her research interests include the psychosocial development in gifted students, perfectionism, creativity, and career development in gifted females.

Dr. Garnet Millar lives in Edmonton, Canada. He is an education consultant in private practice and former Provincial Coordinator for Guidance and Counseling with the Alberta Government's Special Education Branch. Dr. Millar is the biographer of E. Paul Torrance, having authored *E. Paul Torrance—The Creativity Man*, and has collaborated with Dr. Torrance on the 40-year follow-up to the longitudinal study of creativity.

Dr. Alice F. Silvian is Executive Director of the South Carolina Partnership for Distance Education, headquartered in Columbia, South Carolina. Dr. Silvian earned her doctorate in Educational Psychology, Gifted and Creative Education, at the University of Georgia in Athens. Her research interests include creativity and the integration of technology and pedagogy in distant learning settings.

E. Paul Torrance: His Life, Accomplishments, and Legacy

Thomas P. Hébert
Bonnie L. Cramond
Kristie L. Speirs Neumeister
University of Georgia
Athens, Georgia

Garnet Millar
Educational Consultant
Edmonton, Canada

Alice F. Silvian
South Carolina Partnership for Distance Education
Columbia, South Carolina

ABSTRACT

E. P. Torrance: His Life, Accomplishments, and Legacy is a tribute to the renowned creativity researcher, university teacher, and mentor to numerous individuals throughout the world. This monograph is presented in three sections which include a discussion of Torrance's life, followed by an overview of his accomplishments, including his creativity research, the Future Problem Solving Program, and the Incubation Model of Teaching. The monograph concludes with a discussion of his legacy and the Torrance Center for Creative Studies.

E. Paul Torrance: His Life, Accomplishments, and Legacy

Thomas P. Hébert
Bonnie L. Cramond
Kristie L. Speirs Neumeister
University of Georgia
Athens, Georgia

Garnet Millar
Educational Consultant
Edmonton, Canada

Alice F. Silvian
South Carolina Partnership for Distance Education
Columbia, South Carolina

EXECUTIVE SUMMARY

The man whose professional achievements have touched the lives of countless children and adults throughout the world was born on October 8, 1915 in Milledgeville, Georgia. He received his Bachelor of Arts degree from Mercer University, his master's degree in counselling psychology from the University of Minnesota, and his doctorate from the University of Michigan. His interests in creativity began as he encountered difficult students as a high school teacher. Sensing their creative potential, he perceived these students to be more than problem children and wanted to understand more about the characteristics of creative individuals. This interest in creativity deepened as a result of his position as a research psychologist in the Air Force Survival Training Program where he and his staff were able to teach and conduct research on the psychology of survival. Torrance's research during this time laid the foundation for his lifelong pursuit: learning how to identify and develop creative potential. During the USAF survival research program, Torrance learned that the underlying element of survival is creativity, and risk-taking and other creative skills are essential for producing constructive behaviour and unusual achievements.

Following his work with the Air Force, Torrance decided to return to higher education to pursue his research in creativity. He accepted a position at the University of Minnesota as a Professor in the department of Educational Psychology. At that University of Minnesota, Torrance began to carve his research agenda in creativity. He developed a series of instruments designed to measure creativity, the most widely known, The Torrance Tests of Creative Thinking. In addition, he also began his longitudinal study of highly creative elementary school students. Torrance left Minnesota to return to Georgia, where he spent the remainder of his career in higher education at the University of Georgia. Torrance refined his creativity assessments, created the Future Problem Solving Program, developed the Incubation Model of Teaching, and continued his study of the Minnesota participants in his longitudinal study of creativity. By the time he retired from the University of Georgia, Torrance had established an international reputation as a scholar of creativity having published 1,117 books, articles, chapters, tests, and book reviews, as well as delivering countless speeches and workshops at national and international sites. Since Torrance's retirement, the Torrance Center for Creative Studies has been establish to continue his legacy. As a result of his strong mentoring, a number of his students have continued to further his research agenda by continuing to advance the field of creativity research.

E. Paul Torrance's life, accomplishments, and legacy give testimony to his eminence as a mentor, teacher, and scholar. Since his retirement, he has continued to remain prolific, authoring several new books on creativity. Torrance's continued dedication to the field of creativity was perhaps best summarized by the late A. Harry Passow, who stated "There are few names in education who have had as much influence nationally and internationally as my friend and colleague, E. Paul Torrance."

Table of Contents

ABSTRACT vii

EXECUTIVE SUMMARY ix

Introduction 1

E. Paul Torrance: His Life 1
- Growing Up Creatively in Rural Georgia (1915-1936) 1
- The Making of a Scholar (1936-1951) 3
- The Emergence of Creativity (1951-1957) 5
- The Development of Creativity (1958-1965) 7
- Return of the Native: The Application of Creativity (1966-1984) 8
- Retirement Years: Affirming Creativity in Challenging Times (1985-Present) 10

E. Paul Torrance: His Accomplishments 11
- The Torrance Tests of Creativity 11
- Development of the Torrance Tests of Creative Thinking 12
- Components of the Torrance Tests of Creative Thinking 12
- Scoring and Interpretation 13
- The Longitudinal Studies 14
- The Two Follow-ups of High School Students at 7 and 12 Year Intervals 14
- The Two Follow-ups of Elementary School Students at 22 and 40 Year Intervals 16
- Conclusions From Longitudinal Studies 19
- The Future Problem Solving Program 19
- The Incubation Model of Teaching 21

E. Paul Torrance: His Legacy 24
- The Torrance Center for Creative Studies 24
- Torrance's Legacy Continues Through his Students 25
  - Walter Allen 27
  - Robert Alan Black 27
  - Bonnie Cramond 27
  - Dorothy Funk-Werblo 27
  - Kathy Goff 28
  - Joe Khatena 28
  - Felice Kaufmann 28
  - Rod Myers 29
  - William Nash 29
  - Koblus Neethling 29
  - Solange Wechsler 29

Conclusion 30

References 31

List of Figures

Figure 1. Manifesto for Children 18

Figure 2. The Incubation Model of Teaching: Getting Beyond the Aha! 23

E. Paul Torrance: His Life, Accomplishments, and Legacy

Thomas P. Hébert
Bonnie L. Cramond
Kristie L. Speirs Neumeister
University of Georgia
Athens, Georgia

Garnet Millar
Educational Consultant
Edmonton, Canada

Alice F. Silvian
South Carolina Partnership for Distance Education
Columbia, South Carolina

Introduction

Many university communities are the homes of distinguished citizens retired from notable careers in research and college teaching. Athens, Georgia is no exception. Nestled in the heart of a quaint, historic neighborhood of Athens sits a white brick Southern style bungalow with a white wooden fence framing the perimeter of a small yard. Along the fence are rose bushes and a variety of colorful flowers. Tulips line the pathway to the front door. Two majestic trees provide a visitor to the home with cool shade. On the front porch of the home hangs a white wooden swinging chair for two. The front windows display brightly colored glass sun catchers that capture the warm Georgia sunshine.

Approaching this charming home on Cherokee Avenue with its peaceful surroundings, one is greeted at the front door by an elderly gentleman with a shy smile and gentle demeanor. The soft-spoken man at the front door is one of Georgia's most distinguished citizens, Dr. E. Paul Torrance. Many visitors greet him with a bear hug, evidence of the fondness they have for him. Others greet him with reverence as he is someone whose professional achievements have touched the lives of countless children and adults throughout the world.

E. Paul Torrance: His Life, Accomplishments and Legacy is a tribute to the renowned creativity researcher, university teacher, and mentor to numerous individuals throughout the world. This monograph is presented in three sections that include a discussion of Torrance's life story, followed by an overview of his accomplishments, including his creativity research, the Future Problem Solving Program, and the Incubation Model of Teaching. The monograph concludes with a discussion of his legacy and the Torrance Center for Creative Studies.

E. Paul Torrance: His Life

Growing Up Creatively in Rural Georgia (1915-1936)

Ellis Paul Torrance was born on October 8, 1915 to Ellis and Jimmie Paul Torrance on their farm 10 miles east of Milledgeville, Georgia. Paul was the first born of two children—his sister, Ellen, was born 4 years later. Paul's grandfather, James Torrance, owned a 700 acres farm, on which his family lived. His father, a sharecropper, grew cotton,

peanuts, and fruit trees. Most of the family's income came from selling eggs, chicken, beef, pork, butter, and cream. They were poor and always in debt, but fared better than most of the people in the area. As a young boy, Paul was expected to work with his father and hired hands; however, he proved inadequate at farming tasks, due to a learning problem that today would be labeled a disability. The young Torrance felt the shame of his ineptitudes such as not being able to plow a straight line. In an agrarian setting, this inability was more shameful than not being able to read, write, or do arithmetic.

Early Years and School Days

1915	Born October 8th
1923	Started formal education at Union Point School at the age of 7
1928	Impacted by father's rare speech, "It's plain now . . ."
1928-34	Won awards for academic scholarships at elementary, junior high, and high school levels
1936	Influenced by Great Depression
1936	Earned Associate in Arts (A.A.) degree—Georgia Military College

By age six, Paul's parents were aware of his uneven development. He had learned to walk and talk at a precocious age and was a fast runner, but he was not strong, and there were many tasks for which he showed no aptitude at all. As a result, he was not sent to school until age 7, as his parents thought he was not capable of walking the 6-mile round trip to school and defending himself from the attackers of the older and stronger children. His elementary school, Union Point, served grades one through nine. Paul's vivid recollections from his early school years include experiences that nurtured his academic and creative talents. His teachers in grades three and four encouraged his imaginative writing. During this time, Paul had an appendectomy and had to rest for six months at home on the farm where he spent his days writing and finding pictures to illustrate his stories. He also became an avid reader, a passion that was supported by a variety of books supplied by his aunt. The collection included many college textbooks in subjects such as chemistry and biology. As a fourth grader, Paul read them all.

When Paul entered his middle school years, his teachers encouraged him to write, and he entered and won prizes in several writing contests. At the end of his seventh grade, Paul's teacher presented him with a book entitled *Success—Ideals of Great Men* (1927), an apropos title for a young man who would grow up to become an eminent scholar.

Torrance's academic endeavors were supported by his family. With his ineptitude at higher-level farm tasks, his father recognized Paul would never pursue a career as a farmer. Paul described the moment his father let him know his expectations for the future:

> We were eating supper—Daddy, Mama, my sister Ellen, and I. I was 13 and shaving already. The mid-June day began before daylight with my helping to milk the cows and turn the separator. It ended after dark, the same way. I had spent the rest of the day chopping cotton. For supper, we had delicious fresh English peas from our own garden. The way Mama cooked them; they had a delicious juice—or gravy. I was eating them with a spoon—a method that still seems sensible to me. Daddy stopped eating, looked at me, and said seriously and calmly, "It's plain now that you'll never be able to make a living on the farm. You'll have to go to town and you'll have to get an education. It's time you learned to eat peas with a fork!" (Torrance, 1969b, p. 332)

There was no further discussion of the matter. From that point on, Paul Torrance was committed to "getting an education," even though a high school education seemed an impossible dream. That defining moment signified to Paul Torrance that his father accepted him as he was and that it was up to him to work out his way of life. It put an end to years of desperate but unsuccessful attempts to master some of the more skilled farm tasks.

Paul attended Georgia Military College, a combination secondary and junior college designated as an Honor Military Institute by the United States Army. Because of his weak appendectomy incision and heart palpitation, Paul was rejected for military training at Georgia Military College. This allowed Paul extra hours of study each day as his classmates drilled. At Georgia Military College, Paul learned the skills of writing from a literature teacher who held high expectations for his students. It was during this period of schooling that Torrance learned the mechanics of writing, proofreading, and careful documentation—skills he later put to excellent use as a researcher and prolific author. In high school, English, history, and French were his favorite subjects. His teachers displayed an interest in him and encouraged him to succeed.

Following high school graduation, Torrance secured a job measuring cotton acreage in his home county, and he was able to save the funds necessary to attend the 2-year college department at the Georgia Military College. While attending college, he worked in the library and learned to classify books, which piqued his interest in research. The highlight of his college course was his French class. He was the only student and had the undivided attention of an outstanding instructor, Dr. Ren Thorne, who encouraged Paul to take more French courses. These courses became invaluable to Paul as reading French aided him in his later research in the psychology of survival.

Torrance attained the distinction of first honor graduate upon completing junior college at Georgia Military College. Despite tough times experienced by his family in the middle of the Great Depression and the gloom of World War II, Torrance was determined to continue his education. At 21 years old, Torrance had a future image of his career in education, and he was dedicated to developing his skills as a teacher.

The Making of a Scholar (1936-1951)

When Torrance was offered a teaching position at Midway Vocational High School at Hardwick, Georgia, which was close to his hometown of Milledgeville, he eagerly accepted. Although Torrance had only a two-year provisional teaching certificate from the State of Georgia Department of Education, he was allowed to teach. The principal had become ill, and Torrance was substituting for him. Torrance was responsible for most of the instruction in the eighth and ninth grades and for the duties of principalship. Despite these daunting responsibilities, he persisted, developing a love for teaching. He encountered two of the school's problem students who tested his skill as a teacher. Later, Torrance noted these "problem students" grew up to become successful. One young man eventually became the Secretary of Labor in President Ford's Cabinet, while the other became a county school superintendent.

During his first teaching year, Torrance began taking education courses by correspondence. He enrolled in a summer course as the only male student at the Georgia State College for Women. In the fall of 1937, Torrance was offered a teaching position at his alma mater, Georgia Military College. He taught French, Latin, algebra, and history and worked diligently to become an effective teacher. Torrance was able to save enough money to attend Mercer University during the summers and graduated with a Bachelor of Arts degree with first honors in August of 1940. His major was English with minors in history and education.

Early in his teaching career, Torrance had taken courses in psychology and was encouraged by a supportive professor to further his study in this area. Eventually, he decided to pursue graduate work in counseling psychology and to complete his studies at the University of Minnesota, known for the most outstanding faculty in the country including Walter Cook, Gilbert Wrenn, John Darley, Donald Patterson, and E. G. Williamson. He graduated with his Master of Arts degree in August 1944 with a major in educational psychology and a minor in psychology. His thesis was entitled *Predicting and Measuring Success in Plane Geometry.*

Though he was encouraged to continue his studies toward a doctorate in psychology, Torrance was lacking financial resources, and therefore decided to return to teaching at Georgia Military College. As a result of Torrance's excellent teaching at Georgia Military College, he was promoted to the position of principal of the high school department and to registrar of the junior college department. In this capacity, he established an excellent guidance program that was recognized throughout the state of Georgia.

Further Training and Teaching

The Making of a Scholar – Preparation for Creativity

1936	First Teaching Position – Grades 8 and 9
1937	Taught at Georgia Military College
1938	Received teaching certificate from Georgia Department of Education
1940	Graduated from Mercer University with an A.B. degree
	Published first article
1944	Graduated from University of Minnesota with M.A. degree
	Promoted to Principal of high school at Georgia Military College
1945	Worked with disabled veterans at University of Minnesota
	Drafted by U.S. Army
1946	Released from U.S. Army to accept position as a counsellor at Kansas State College (KSC)
1947	Appointed Dean of Men at KSC
	Pursued his own professional development
1948	Started working on doctorate at University of Michigan as a full-time student
1949	Returned to KSC as Director of the Counseling Bureau and Professor of psychology
1951	Received Ph.D. degree from University of Michigan

In December of 1944, Torrance was offered a full-time counseling position in the Counseling Bureau at the University of Minnesota. Disabled veterans were returning to colleges and universities, and the Veterans Administration was establishing counseling centers to help them adjust and make decisions about college life. Torrance gladly accepted, excited to return to Minnesota to work and have the opportunity to take courses toward his doctorate. He was productive in his position, publishing several articles. As the United States became more involved in World War II, Dean Williamson advocated for Torrance to be excused from the draft to continue his professional responsibilities. His efforts were in vain as Torrance was drafted into the army in June 1945.

First stationed at Camp Lee in Virginia, Torrance found basic training challenging as a result of his disabilities. He could not keep step nor hit a target; however, he could out-walk almost any soldier. During the 13-month period in the U.S. Army, he was stationed in

various regions of the United States: Fort Oglethorpe, Georgia, Fort Hancock, New Jersey, and Fort Bragg, North Carolina. As a sergeant he was assigned to be a psychiatric social worker and psychologist in the army. In this position Torrance deepened his knowledge of psychology. He became familiar with tests, such as the Rorschach Inkblot Test, the Bender Gestalt Test, and the Army Individual Intelligence Test. He also conducted a program of group psychotherapy and group guidance for men who were dishonorably discharged. In June of 1946, Torrance was offered a position in the Counseling Bureau for Veteran's Administration at Kansas State College. Torrance left the Army with some sadness, as he had felt proud of the service he had provided and the professional training he received.

The following year Torrance was appointed Dean of Men at Kansas State College, in addition to his counseling duties. During this time, Paul also pursued more professional development opportunities—Rogerian counseling with Dr. Bill Lemmon and psychodrama and sociodrama with Dr. Jacob Moreno, which he later used with his graduate students at the Universities of Minnesota and Georgia. Dr. Moreno encouraged Paul Torrance to complete his doctorate. After receiving financial support, Torrance decided to pursue his doctorate at the University of Michigan and was able to devote his total energies to graduate coursework. Paul's interests had shifted from counseling to classroom interaction. He completed his coursework in 1949 and then returned to his job at Kansas State College where he wrote his dissertation entitled, *Self-concepts and Their Significance in the Learning and Adjustment of College Freshmen*. Torrance received his doctorate from the University of Michigan in 1951 and actively sought a full-time research position.

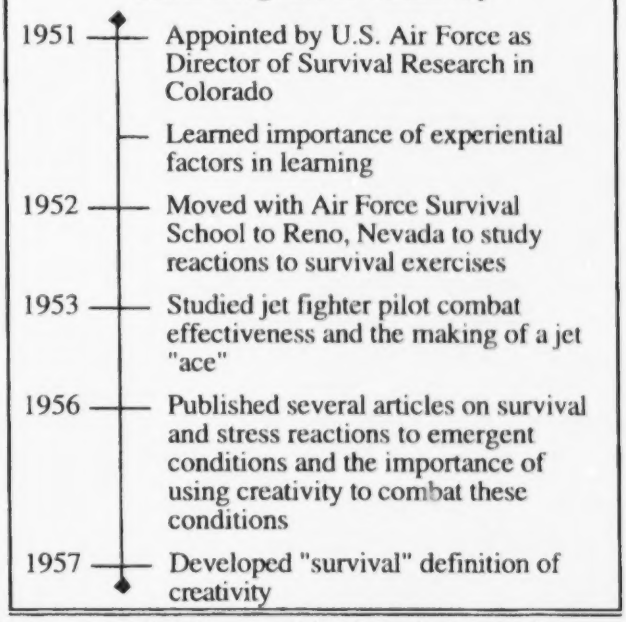
The Emergence of Creativity (1951-1957)

Paul Torrance's interest in creativity can be traced back to 1937 when, as a counselor and high school teacher in rural Georgia, he was struggling with some difficult students. Torrance concluded that many of the students were sent to this boarding school by their families because of their off-beat ideas that were untolerated by their former teachers. Torrance noted that many of the most difficult students went on to become successful in politics, business, the military, education, the arts, science, and other fields (Torrance, 2001a). Sensing their creative potential, he perceived these students as more than problem children.

Torrance's interest in creativity was heightened upon reading Margaret Broadley's (1943) book *Square Pegs in Square Holes*, in which she described a test to measure creative imagination. Broadley described creativity as aptitude which, "unless it is used and directed into the right channels, it is like a wild colt roaming the prairies, picturesque, perhaps, but little else. . . . Well directed and developed, the aptitude can lead you into deeply satisfying creative work" (p. 69). Inspired by this idea, Torrance later developed a test to measure the creativity of elementary school children, entitled the *Mother Goose Test*.

World War II interrupted Torrance's teaching career, but not his interest in creativity. While serving in the U.S. Army and working as a counselor for disabled veterans, he met more individuals whom he described as "wild colts" and recognized their creativity (Torrance, 2001a). Later, when working for the Air Force Survival Training Program as a research psychologist, he discovered a way to use that observation. He recognized indications of "wild colts" from the biographical data of the jet aces and further indications of their creativity in their responses to the Rorschach and in their scores on the Risk-Taking Scale of a biographical inventory (Torrance, 1954b). The difference between these men and the discipline problem students Torrance worked with in the Georgia schools was that the jet aces had learned to discipline themselves and use their creativity productively (Torrance, 2001a).

The Emergence of Creativity


1951
Appointed by U.S. Air Force as Director of Survival Research in Colorado
Learned importance of experiential factors in learning
1952
Moved with Air Force Survival School to Reno, Nevada to study reactions to survival exercises
1953
Studied jet fighter pilot combat effectiveness and the making of a jet "ace"
1956
Published several articles on survival and stress reactions to emergent conditions and the importance of using creativity to combat these conditions
1957
Developed "survival" definition of creativity

The psychology of survival was taught to groups of combat aircrew ranging from missile and scientific teams to Distant Early Warning (DEW) line teams. Every 17 days, new teams of aircrew personnel were trained at the survival school located at Stead Air Force Base in Reno, Nevada. Torrance and his staff were able to teach and conduct research on the psychology of survival. During his 7 years working for the U.S. Air Force, he and his colleagues wrote 135 research papers that have been recognized and used nationally and internationally. They taught men to survive in unusual and extreme conditions—mountainous country, jungle environments, desert, and frigid conditions. In one research study, "Portrait of an Ace," (1954a) conducted during the Korean conflict, reported in *Time* magazine, Torrance stated, "I have nothing but admiration for them . . . . The jet ace is a man who goes out into life and meets it head on" (p. 38). Torrance's later research on creativity revealed that the description of the jet ace—a courageous risk-taker who is independent and committed—was also the description of a creative person.

Torrance's research during this time laid the foundation for his lifelong pursuit: learning how to identify and develop creative potential. During the U.S. Air Force survival research program, Torrance learned that the underlying element of survival is creativity and that risk-taking and other creative skills are essential for producing constructive behavior and unusual achievements. In his words,

> Many of my ideas emerged from my survival research with the USAF. It was not until my retirement that I realized how much I have been influenced by this . . . . In the survival schools, the goal was to train men to behave effectively in emergencies and extreme conditions. (Personal communication, December 20, 1991)

From these experiences, Torrance developed his survival definition of creativity, "whenever one is faced with a problem for which he has no practiced or learned solution, some degree of creativity is required" (Millar, 1995, p. 39).

Working for U.S. Air Force, Torrance learned about the important role of participatory learning and gained powerful new insights about group dynamics and interpersonal development. Torrance reflected, "I became a firm believer in experiential learning, cooperative learning in small groups, learning in all modalities, tolerance of disagreement in groups, the extreme importance of motivation and creative thinking," (Personal communication, December 20, 1991).

When the combat over Korea ended, support for social science research was reduced, and the survival research training program was phased out. Paul Torrance made the decision to resume his career in higher education.

The Development of Creativity (1958-1965)

Albert Zander, a professor from the University of Michigan and Donald Super of Teachers' College, Columbia University—both consultants to Paul Torrance during his survival research period—informed Dean Walter Cook at the University of Minnesota that Torrance was leaving his Air Force assignment and would be available. Torrance was offered a position as Director of the Bureau of Educational Research and Professor of Educational Psychology in the College of Education. Torrance accepted this position recognizing an atmosphere of intellectual freedom in which philosophical differences were appreciated. Based on his background in survival research on groups under stress, Torrance knew that this was a quality conducive to productivity.

Dean Cook provided substantial support to Torrance and other faculty who did innovative research in new fields, including the provision of financial resources, space, equipment, research assistants, and clerks. Cook's efforts to develop a research climate were reflected in his annual ringing challenge to faculty when he said, "At least fifty percent of what you are teaching your classes is untrue, and it is time you find out which half that is" (Millar, 1995, p. 43).

Torrance appreciated this challenge, realizing gaps in knowledge about many areas, such as the human mind and personality and their workings, the learning process, instructional methods, and curriculum development. The recognition of these gaps in knowledge was the first step toward productive research; Torrance could then search for clues from other bodies of knowledge, formulate guesses, test them, communicate the findings, and ultimately, apply them.

The Development of Creativity

1958	Appointed Director of the Bureau of Educational Research and professor at the University of Minnesota
	Research was impacted by the launch of the Russian Sputnik
	Initiated longitudinal study of creative talent in elementary school students
	Began designing tests of creativity
	Hosted first of three Minnesota conferences on the gifted
1959	Married Pansy Nigh
	Launched longitudinal study of creative talent in high school students
1960	Launched cross-cultural study of creativity
1961	Attained national recognition for creativity by publication of article in *Look Magazine*
1962	Published first book on creativity
	Listed in *Who's Who in America*
1965	Published teacher resource materials to enhance children's creativity
	Accepted job offer from the University of Georgia

Following the launching of Sputnik and the beginning of the space race, the atmosphere nationwide was conducive for the emergence of creativity research, and it was particularly favorable at the University of Minnesota. The Faculty Advisory Board to the Bureau of Educational Research (BER) recommended the design and implementation of a pioneering research program on

giftedness, to extend over the next 25 years. Dean Walter Cook had observed that children in the laboratory school varied greatly on different tests of ability, aptitude, and intelligence. Within this research program on giftedness, Torrance had the opportunity to develop his ideas about creativity.

Torrance's first two years at the University of Minnesota were particularly eventful. He worked with intellectually stimulating and supportive colleagues as well as motivated students and research assistants. His research focused on defining, measuring, and developing creativity. At this time, he initiated two longitudinal studies of creative talent in both elementary and high school students. A cross-cultural study of creativity was also a focus of his research at this time.

As a professor, he made his course, *Personality and Mental Health*, famous. For Torrance, this course was also the venue through which he met his future wife, Pansy. Pansy, a nursing student, heard that Torrance was an excellent teacher. Torrance was attracted to her outgoing personality and warmth and soon felt comfortable with her. They were different from one another yet complementary; Pansy was able to express her emotions and affections openly, while Paul could not, and Pansy would quickly see the humor in situations, where Paul brought insight into the partnership. They were both brought up in Southern Baptist churches and were married in the church on Thanksgiving day, 1959. Pansy was 46 years of age, while Paul was 44. It was the beginning of a happy life partnership.

Meanwhile, Torrance's professional life was also flourishing. He continued his research studies and received national recognition with the publication of "The Creative Child" by *Look Magazine* in 1961. He was flooded with letters requesting information on creativity and was highly sought after as a conference speaker. His first book on creativity, *Guiding Creative Talent*, published in 1962, was a huge success.

Torrance was offered several distinguished professorships in 1965, but a visit to his parents in Milledgeville, Georgia, in April of 1965, convinced him to accept a position offered by Dean Joseph Williams of the University of Georgia in Athens as the Head of the Department of Educational Psychology. The Georgia native had decided to return home.

Return of the Native: The Application of Creativity (1966-1984)

In 1966 E. Paul Torrance returned home to Georgia after being away for 22 years. He realized, at age 51, he would likely retire in his home state. Besides wanting to be closer to his parents and relatives, he knew that education in the state of Georgia was becoming more progressive, and he wanted to contribute to this movement.

The University of Georgia was experiencing a period of unprecedented growth, and Torrance's appointment as Professor and Chair of the Department of Educational Psychology, Research, and Measurement marked the beginning of many changes. The department more than doubled in size under his leadership, and he established three new programs—School Psychology, Gifted and Creative Education, and a Child Guidance Clinic.

Outside sources for funding of creativity research were scarce, but this did not deter Torrance from his agenda. With full-time support from Pansy and the contributions from his royalties, Torrance was able to continue his research productivity and maintain a high level of publications in major reviews. During these busy times at the University of Georgia, he was able to establish his reputation as a professor by creating several new graduate level courses, designing a kindergarten curriculum using a creative-aesthet

approach, and developing a creative strand/component to the Ginn Reading 360/720 program. In addition, he also refined his creative tests as the *Torrance Tests of Creative Thinking* and designed others, such as *Thinking Creatively in Action and Movement*. Torrance also created the Future Problem Solving Program, which became internationally renowned. His research productivity also continued, with the first follow-up investigation of the Minnesota participants involved in his longitudinal study of creativity. He also published and co-authored 1,117 books, articles, chapters, tests, and book reviews, as well as delivering countless speeches and workshops at national and international sites. He was invited to serve as a visiting scholar in Japan where he conducted research and presented seminars and lectures to professional organizations and university students.

During these years in Georgia, Pansy became a willing supportive and contributing partner in Torrance's research and teaching activities. She was as involved as Paul in their church where they designed a curriculum for preschool children to be used by Sunday school teachers. Pansy suffered a stroke in December of 1980, and Paul was forced to postpone much of his research and speaking

Return of the Native: The Application of Creativity

- 1966 — Returned to native Georgia as chair and professor of the Educational Psychology Department at the University of Georgia
- Published *Torrance Tests of Creative Thinking*
- 1967 — Acted as Creativity Consultant to Ginn and Company to develop creativity strand to a new reading series
- Began to be cited for exemplary work in identifying and developing creative abilities in children
- 1970 — Appointed by President of United States to White House Conference on Children
- Conducted creativity workshops for disadvantaged children
- 1971 — Made recommendations to Governor Jimmy Carter on Governor's Honor Program
- 1972 — Recognition of books on creativity by national associations
- 1973 — Named Alumni Foundation Distinguished Professor by President of UGA Athens for outstanding achievement in teaching, research and service
- 1974 — Founded the **Future Problem Solving Program**
- 1978 — Appointed Visiting Scholar for the Japanese Society for the Promotion of Science
- 1979 — Spent 2 months in Japan visiting universities and encouraging international cooperation in scientific research
- Published book, *Search for Satori and Creativity*
- 1980 — Completed data collection for 22-year follow-up of creative behavior of elementary students
- Nursed Pansy after her stroke
- 1984 — Suffered a stroke himself
- Established Torrance Archives at UGA
- Established at College of Education (UGA), Torrance Center for Creative, Gifted and Future Studies
- Retired.

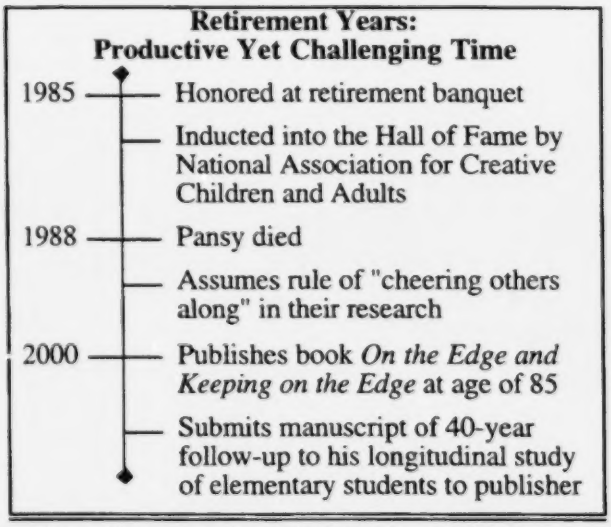
engagements so that he could assist his wife at home. At age 65, he began to contemplate retirement for the first time.

In the fall of 1984, at the age of 69, Paul Torrance retired from the faculty at the University of Georgia so that he could care for his wife, Pansy. He gave 18 years of service to the University of Georgia. Although Paul planned to use his time after retirement to travel and complete many projects, Pansy's illness, along with a stroke he suffered a month later, changed his life. He and Pansy both required extensive care as they recuperated. Due to both of their health problems, Paul's retirement was not celebrated until a year later. Dr. Mary Frasier and her staff at the Torrance Center organized a two-day retirement party held in March 1985. Over 250 students, friends, family members, and colleagues from all parts of the country returned to Athens, Georgia to honor Paul Torrance. As part of the celebration, Torrance gave the first annual E. Paul Torrance Lecture. He chose to highlight the careers and significant contributions of his students, characteristically deflecting the focus from himself. His lecture emphasized the global network of his students who in turn have affected thousands of others.

During his tenure at the University of Georgia, Paul Torrance shone as an administrator, teacher, and researcher. He had the strong support of Dean Joseph Williams to reorganize and expand the university's Department of Educational Psychology, Measurement, and Research. He refined his tests of creative thinking and developed new ways to teach the skills of creative thinking. He developed new courses to make students aware of the significance of creativity in their personal and professional lives. In addition, the Future Problem Solving Program affected the future thinking of thousands of children around the world. It was fitting that the University of Georgia established a Center as a living memorial to the work of E. Paul Torrance.

Retirement Years: Affirming Creativity in Challenging Times (1985-Present)

With Torrance's retirement came more awards honoring his achievements. The National Association for Creative Children and Adults inducted Torrance into the Hall of fame in April 1985. In August of 1985, Paul Torrance was granted Professor Emeritus status by the University of Georgia. His full academic title was Alumni Foundation Distinguished Professor Emeritus of Education.


Retirement Years:
Productive Yet Challenging Time
1985
Honored at retirement banquet
Inducted into the Hall of Fame by National Association for Creative Children and Adults
1988
Pansy died
Assumes rule of "cheering others along" in their research
2000
Publishes book *On the Edge and Keeping on the Edge* at age of 85
Submits manuscript of 40-year follow-up to his longitudinal study of elementary students to publisher

During this time period, both Paul Torrance and his wife continued to struggle with health problems. It was a difficult time for both of them, yet they faced these problems with courage and made appropriate adjustments in their lifestyle. Sadly, Pansy died in November of 1988 after 29 years of marriage. Paul wrote the following description of her at the time of her death:

Pansy Nigh Torrance, 1913-1988. Nurse. Nursing Educator and Crusader, Teacher Extraordinnaire, Children's Rights Advocate, Mid-wife to the Creative Process, Pioneer for Future Problem Solving.

Following his wife's death, Paul Torrance re-dedicated his life to the pursuit and support of creativity by continuing to write, research, and encourage others' work in the field of creativity. A number of accomplishments are noteworthy in the last decade of his life. He assisted Dr. Claire Clements in designing the *Quality of Life* program, which uses physical and creative activities to increase the self-sufficiency and independence of elderly people with developmental disabilities. He also revised his book, *The Search for Sartori and Creativity*, to *Making the Creative Leap Beyond* with Dr. H. Tammy Safter.

After analyzing the data from his 30-year follow-up study of high school students, he coined the term "beyonders" to describe those highly creative individuals who had achieved so far beyond their counterparts that they could not be placed on the same scale. At present, he is continuing to analyze the data from the 40-year follow-up study of the elementary student participants. Finally, he maintains correspondence with people from all over the world who continue to seek his expertise and advice concerning their work in the field of creativity.

E. Paul Torrance: His Accomplishments

Although Torrance is readily identified with his eponymous tests of creativity, assessment of creativity was not a goal of Torrance's. The tests were designed as a means to an end, not an end in themselves. Torrance's primary interests lie in discovering and nurturing the qualities that allow individuals to express their creativity fully. "I have always been interested in empowering children, releasing their creative potential. But first I had to measure that potential. So I have a reputation as a psychometrician, but all along I have worked with the development of creativity" (E. P. Torrance, Personal communication, December 22, 1989). Individuals more familiar with Torrance's work know that his establishment of the Future Problem Solving Program (Torrance, Bruch, & Torrance, 1976), development of the Incubation Model for creative teaching (Torrance & Safter, 1989), and founding of the Creative Scholars Network give testimony to these words (Frasier, 1990). However, the scientific community, especially in the behaviorist environment of the 1960s, required some observable, measurable means to discover if creative strategies were effective for increasing creative responses. Therefore, Torrance set out to design a means of assessing creativity—a daunting task, to be sure.

In 1958, Torrance was provided an ideal opportunity to continue his research in creativity when he was hired as Director of the Bureau of Educational Research at the University of Minnesota where he was charged with beginning a longitudinal study of the various kinds of giftedness that children can display (Torrance, 2001a). "I decided to concentrate on creativity first, then go on to study other kinds of abilities. However, creativity was too overwhelming, so I never left it. I started to develop measures of creative potential" (E. P. Torrance, Personal communication, December 22, 1989).

The Torrance Tests of Creativity

Torrance's early forays in creativity assessment extended in three directions. He continued to work on the biographical inventory that he had used with the pilots, but he also saw the need to assess creative motivation and creative thinking abilities. After some initial work, the research on the biographical inventory (Torrance & DeYoung, 1958) and creative

motivation (Torrance, 1959, 1963, 1985) were left incomplete while Torrance and his colleagues focused on measuring creative abilities through the design and refinement of the *Torrance Tests of Creative Thinking* (TTCT) (Torrance, 1966, 1974). Although Torrance saw the development of the tests as a means to an end, these tests of creative thinking have gained worldwide attention. The TTCT have been used in over 2,000 studies and have been translated into more than 32 languages (Frasier, 1990).

Development of the Torrance Tests of Creative Thinking

Before developing the tests of creative abilities, Torrance determined that he needed a research definition that would guide the process better than his practical definition. He examined many definitions before settling on a definition that described creativity as a natural process, possible at any age, arising from a strong human need to resolve the tension experienced when something is sensed as missing or incomplete. This put creativity within the realm of everyday people rather than only a few geniuses (Torrance, 2001a). Torrance's definition is as follows:

> Creativity is a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results. (Torrance, 1974, p. 8)

As if the task of measuring creative abilities were not difficult enough, Torrance determined that each activity he would use had to meet the following criteria: It had to be (a) a natural, everyday process; (b) suitable for all ages and educational levels, kindergarten through graduate and professional school; (c) easy enough for the young or disabled to make a creative response, yet difficult enough to challenge the most able; (d) unbiased with regard to gender and race, and open-ended to allow for responses from different experiential backgrounds; and (e) fun (Torrance, 1966, 1974, 2001a).

Torrance then set about reviewing activities that others, such as Barron (1957), Flanagan (1957), and Guilford (1956), had created as well as designing new activities. He sought both verbal and figural activities, and tried to find equivalent pairs of activities to create equivalent forms of the tests. Torrance personally screened each activity and observed its administration to various groups so that he could monitor individual and group responses. When items such as *Mother Goose* prints, coat hangers, bicycles, the doctor's kit, and the nurse's kit were found to have a differential response pattern for different races, socioeconomic groups, and genders, they were replaced (Torrance, 2001a). Those that were retained for the test: (a) were the most different from one another as determined by factor analysis, (b) provided maximal sampling of the thinking involved in creative achievements in various domains, and (c) best elicited responses from both children and adults (Torrance, 1966, 2001a). The resultant battery of activities, called the *Minnesota Tests of Creative Thinking* was the predecessor of the TTCT that were developed after Torrance moved to the University of Georgia (Torrance, 1966, 1974).

Components of the Torrance Tests of Creative Thinking

The TTCT entire battery is composed of a verbal and figural component and is available in two forms, A and B. Each activity is based on research linking the required ability to creativity (Torrance, 1966, 1974). Therefore, the two components, when given as an entire battery, measure several different creative abilities. The verbal and figural tests of the TTCT are not simply measures of the same creative abilities or tendencies expressed in two different modalities. In fact, performance on the verbal and figural measures show very

little correlation (r=.06) (Torrance, 2001a). With both measures, the instructions are designed to motivate the respondents to give unusual, detailed responses.

The verbal component consists of five different types of activities: Ask-and-Guess, Product Improvement, Unusual Uses, Unusual Questions, and Just Suppose. The stimulus for each task consists of a picture to which individuals respond in writing. The figural component consists of three different activities that take 10 minutes each: Picture Construction; Incomplete Figures; and Repeated Figures (Torrance, 1974, 2001a). All of these activities require respondents to draw additions to shapes and incomplete figures to give meaning to the shapes.

There is now a short form of the TTCT that combines elements of the verbal and figural into one test, the Brief Demonstrator Form of the TTCT (BD-TTCT) (Goff & Torrance, 2000). Although lacking the history and research trail of the complete battery, it is suitable as a screening instrument.

Scoring and Interpretation

After designing and choosing the activities, the next task for Torrance was to choose a scoring system for the tests. Over the years he tried several different scoring systems. Some were rejected because they were either ineffective, inefficient, or both. Torrance decided to use Guilford's (1956) four divergent thinking factors as follows: (a) fluency—the number of relevant responses, (b) flexibility—the number of different categories or shifts in responses,(c) originality—the number of unusual yet relevant ideas, as determined by statistical infrequency, and (d) elaboration—the number of details used to extend a response (Torrance, 1966, 1974, 2001a).

For years the tests were scored in this manner. Then Torrance decided to enhance the scoring of the figural tests by designing the streamlined scoring system, as explained in the Streamlined Scoring Workbook (Ball & Torrance, 1984). Using this system, the figural tests are scored according to five norm referenced scores and 13 criterion referenced scores. The norm referenced scores include fluency, originality, and elaboration with the new addition of abstractness of titles, as a verbal measure on the figural tests, and resistance to premature closure, as a gestalt measure of a person's ability to stay open and tolerate ambiguity long enough to come up with a creative response. (Flexibility scoring was eliminated because it correlated very highly with fluency.) The 13 criterion referenced measures of Creative Strength were derived from years of creativity testing and research into creative characteristics by Torrance. He was concerned that the norm referenced score did not measure all of the manifestations of creativity that he had observed (Torrance, 1979). Therefore, the 13 items on the checklist are: emotional expressiveness, storytelling articulateness, movement or action, expressiveness of titles, synthesis of incomplete figures, synthesis of lines or circles, unusual visualization, internal visualization, extending or breaking boundaries, humor, richness of imagery, colorfulness of imagery, and fantasy. The scoring of the verbal tests was simplified to include only fluency, flexibility, and originality because of the difficulty in achieving inter-rater reliability for untrained scorers on elaboration (Torrance, 1966, 1974).

Although both the verbal and figural tests yield a composite score, Torrance has dissuaded interpretation of scores as a static measure of a person's ability and encouraged the use of the profile of strengths as a means to nurture creativity (Torrance, 1966, 1974, 1979). He has, however, indicated that "such a score does seem to give a rather stable index of the total amount of creative energy a person has available or is willing to use" (Torrance, 1974, p. 56). He is aware that the use of the full battery of the TTCT, Verbal and Figural, is still not able to measure the essence of creativity. He has argued that a high degree of these

abilities—usually designated as fluency, flexibility, originality, and ability to sense deficiencies, elaborate, and redefine—does not guarantee that the possessor will behave in a highly creative manner. A high level of these abilities, however, increases a person's chances of behaving creatively (Torrance, 1974).

The Longitudinal Studies

The next challenge that Torrance faced was to establish predictive validity for his tests. No matter how much face validity the tests seemed to have, Torrance knew that their true value lay in their ability to adequately predict adult creativity. He also realized that trying to predict something like creativity would be especially daunting. First, there was the complex nature of the construct itself and its tenuous developmental path. Torrance realized that the best measure of creative abilities would not measure all creative abilities much less the "hundreds of possible vectors of influence on development, including the centrally important specific physical, emotional, and intellectual qualities of the individual whose development we are trying to comprehend" (Feldman, 1988, p. 276).

Then, there were the additional challenges of longitudinal research. Practical problems needed consideration, such as tracking down participants, storing the data, and finding support for such an extensive and expensive enterprise. Measurement concerns also surfaced such as attempting to correlate paper and pencil test scores to real-life accomplishments, participant attrition, and increasing variability of participants' experiences. Torrance was especially concerned that the decrease in creative thinking he had witnessed in the young children during the initial testing, which he termed the "fourth grade slump," (Torrance, 1966, 1968) represented a trend that would continue over time and destroy the best predictions (Torrance, 1981a). Finally, Torrance had to overcome several personal challenges—a move to the University of Georgia to assume the challenging role of chair of a newly created department, the death of his father, and negative publicity about the research, which exacerbated the problem of finding funding (Torrance, 2001a).

Despite the challenges, at least seven longitudinal studies have been conducted examining the predictive validity of the TTCT. The preliminary studies, which were done with limited samples within a few years of the administration of the tests, were conducted with elementary education majors (Torrance, Tan, & Allman, 1970), a group of seventh grade students (Cropley, 1971), and a small group of economically disadvantaged, elementary school, Black children (Witt, 1971). These investigations gave some credibility to the *Torrance Tests of Creativity* as predictors of later creative productivity.

However, the major body of longitudinal research is comprised of the four major points of data collection initiated by Torrance in two elementary schools and a high school in Minneapolis in the late 1950s (Torrance, 1969a, 1972a, 1972b, 1980, 1981a). Beginning in 1958 and continuing through 1964, all pupils enrolled in grades 1-6 in two elementary schools were administered various batteries of the TTCT each year. Beginning in September of 1959, all students enrolled in grades 7-12 of the University of Minnesota High School also completed the tests. The follow-ups with these students have attempted to answer the question of how well the TTCT predict later creative productivity. These studies are summarized below; detailed information on all of the studies has been presented elsewhere (Torrance, 1969a, 1972a, 1972b, 1980, 1981a) and is also collectively reported in Cramond, 1994.

The Two Follow-ups of High School Students at 7 and 12 Year Intervals

The first follow-up of the Minnesota group was conducted in the spring of 1966 with the students who were seniors in 1959. Measures administered while the students

were in high school included the TTCT, *Iowa Test of Basic Skills*, and for most of them, the *Lorge-Thorndike* or the *Stanford-Binet Intelligence Scale*. In addition, a sociometric questionnaire was completed that requested students to nominate three of their classmates on the basis of five questions that queried about who had the most ideas, most original ideas, most inventions and gadgets, and who was best at thinking of details and finding solutions to problems (Torrance, 1969a). From these measures, the predictor variables of intelligence, high school achievement, peer nominations of creativity, and creativity as measured by the TTCT in scores of fluency, flexibility, originality, and elaboration, were derived.

Criterion data were obtained for 46 of the original 69 subjects with a follow-up questionnaire. The questionnaire yielded biographical and demographic information, as well as self-reported data on the participants' most creative achievement, aspirations, and the type and degree of creative accomplishments. Besides achievement in the arts, the items included such things as: research, work, innovations, inventions, and change in life philosophy (Torrance, 1969a).

From this information, five trained judges derived three indices of creative achievement: quantity of creative achievements; quality of creative achievements (the inter-rater reliability coefficient was .65); and creative motivation (the mean inter-rater reliability coefficient was .69) (Torrance, 1972a). Product-moment correlation coefficients were calculated to determine the degree of relationship between the predictor variables and the criterion variables (complete tables are available in Cramond, 1994; Torrance, 1969a, p. 226, 1972b, p. 247). With the alpha level set at .01, three of the TTCT components—fluency, flexibility, and originality—correlated significantly with all three criteria—quality of creative achievements, quantity of creative achievements, and creative motivation. Intelligence correlated with quantity of creative achievements. The significant correlations ranged from .37 to .48. Therefore, three of the component scores of the *Torrance Tests of Creativity* (fluency, flexibility, and originality) were better predictors of creative achievement than intelligence, high school achievement, or peer nominations. When the four TTCT scores were entered into a stepwise regression equation, the following multiple correlation coefficients were obtained: (a) .50 with Creative Quality, (b) .46 with Creative Quantity, and (c) .51 with Creative Motivation. In other words, the four TTCT scores accounted for 25% of the variance noted in Creative Quality, 21% of the variance in Creative Quantity, and 26% of the variance in Creative Motivation.

Five years later, Torrance sent a similar questionnaire to the entire 1959 University of Minnesota High School population (n=392). The response rate was approximately 60% with 117 females and 119 males returning the completed questionnaire (Torrance, 1972b). Once again, expert judges derived the three indices of creative achievement: creative quantity, creative quality, and creative motivation. The mean inter-rater reliability coefficient of the five judges was .91. This time there were enough respondents to analyze the information by gender. High school achievement and peer nominations were dropped from the list of predictors because they had not proven to be helpful to the prediction in the prior study. Inventive level derived from the peer questionnaire was then added to the list as a predictor. All of the creativity predictors were found to be significant at the .01 level.

By combining the scores on the creativity test battery administered in 1959 into a total creativity score to predict the combined creativity criteria derived in 1971, a canonical correlation of .51 was obtained for the full sample. When looking at the genders separately, a canonical correlation of .59 was obtained for males and .46 for females.

These findings were heartening, but the largest challenge still loomed—the follow-up of the elementary school students. Not only was this more challenging because of the

much longer period of time between testing and follow-up data collection, but also because much more data had been collected from the elementary school students over several years, so there was a more complex predictor set.

The Two Follow-ups of Elementary School Students at 22 and 40 Year Intervals

Between 1958-64 students enrolled in grades 3-5 at two Minneapolis test-site elementary schools completed a variety of measures of creative thinking, including various forms of the TTCT, a biographical inventory, creative writing samples, check lists of creative activities performed on their own, *Buck's House-Tree-Person Test* as a measure of intelligence, and sociometric questionnaires. In addition, standardized intelligence and achievement test scores were available for most of the participants. In 1979-80, a follow-up was conducted with the students who met the criteria of having completed one or more batteries of creativity tests each year for at least 3 years. Of the 400 participants who met this criterion, approximately 70% were located and sent questionnaires. Of these, 211 (116 females and 95 males) returned the completed questionnaires (Torrance, 1980, 1981a). Approximately 53% of the 400 eligible participants returned questionnaires, a 75% response rate.

A creativity index was calculated for the respondents using data collected over 3 years of creativity testing. It was derived, in part, by converting raw scores for all of the tests available for a specific school year to standard scores based on the national norms accumulated in the early 1960s. The mean creativity index of the respondents did not differ significantly from national norms, nor did it differ significantly from the mean for students in the initial study. Therefore, it was concluded that the respondents were representative of the initial study sample (Torrance, 1981a).

Two questionnaires were used. The first elicited biographical and demographic information similar to that requested in the follow-up of the high school students (Torrance, 1972a, 1972b). Among many other questions, it asked about career ambitions and projections, high school creative achievements, post high school creative achievements, and the achievements considered most creative by the students themselves. Those who returned the first questionnaire were sent a second questionnaire, designed specifically to generate responses about the individuals' "Creative Style of Life Achievements," achievements that are not ordinarily publicly recognized and acknowledged, such as organizing an action-oriented group (Torrance, 1981a).

For this follow-up, five indices of creative achievements were derived by the expert judges from the questionnaire responses and used as criteria: (a) number of high school creative achievements, (b) number of post high school creative achievements, (c) number of "creative style of life" achievements, (d) quality of highest creative achievements, and (e) creativeness of future career image. The final index differed slightly from the Creative Motivation Index used in the 1966 high school follow up in that the respondents answered two questions that judges rated on the creativeness of the future career images—realistic and fantasy. The inter-rater reliabilities obtained using Cronbach's alpha were .81 for both male and female respondents (Torrance, 1981a).

To determine how well the creativity measures predicted future achievements, Pearson Product Moment Correlation coefficients were calculated between the creativity index derived from elementary school assessments and each of the five indices of creative achievement obtained 22 years later (Torrance, 1981a). All correlation coefficients were significant at the .001 level (see Torrance, 1981b, p. 60). A multiple correlation coefficient of .63 was obtained for the five criteria entered into stepwise multiple regression equation.

In 1988, 40 years after the initial testing, Torrance initiated another data collection point based on the same design as the last one with a few modifications. This time 99 of the 170 respondents who were located returned the questionnaire, 45 males and 55 females. This is approximately one fourth of the original eligible group of participants, and approximately one half of the number that responded in 1980.

The same index of creativity that was derived for the elementary sample based on 3 years of TTCT testing was used. Also, the same questionnaire items were used.[1] There were eight predictor variables in the analysis this time. The predictors included: (1) IQ, (2) fluency, (3) flexibility, (4) originality, (5) elaboration, (6) the checklist of creative strengths, (7) whether respondents had a mentor in 1980, and (8) whether respondents had a mentor in 1988.

Two criteria of creative achievement were derived from the questionnaire responses: (a) number of publicly recognized creative achievements, and (b) quality of public achievements. Because the respondents were now mature adults, it did not seem suitable to measure their aspirations. As in the 1980 study, three expert judges rated the number and quality of creative achievements. The 1998 judges' inter-rater reliabilities were obtained using Pearson Product Moment Correlations resulting in coefficients ranging from .78 to .88.

The results of a Pearson Product Moment Correlation between predictors obtained at childhood and criteria of adult achievement obtained 40 years later indicated that IQ was a significant predictor of quantity ($r = .44, p \leq .01$) and quality ($r = .46, p \leq .01$) of creative achievements for females, but not for males. Originality was a significant predictor of quality of creative achievements for both males ($r = .32, p \leq .05$) and females ($r = .40, p \leq .01$), and the checklist of creative strengths was a significant predictor of quality for males ($r = .45, p \leq .01$) and both quality ($r = .41, p \leq .01$) and quantity ($r = .29, p \leq .05$) for females (see Cramond et al., 2001). Having had a mentor in 1980 was significantly related to females' quantity ($r = .41, p \leq .01$) and quality ($r = .50, p \leq .01$) of creative production, but not to males. Having had a mentor in 1998 was related to both males ($r = .36, p \leq .05$) and females ($r = .40, p \leq .01$) quality of creative production, but not to the quantity. As might be expected, quantity and quality of creative production were highly correlated for both males ($r = .90, p \leq .01$) and for females ($r = .81, p \leq .01$). This provides further evidence of the link between quantity of ideas and the production of quality ideas.

[1] There was the addition of a set of questions based upon the *Manifesto for Children* (Henderson, Presbury, & Torrance, 1983, see Figure 1), but these analyses will not be included in this discussion.

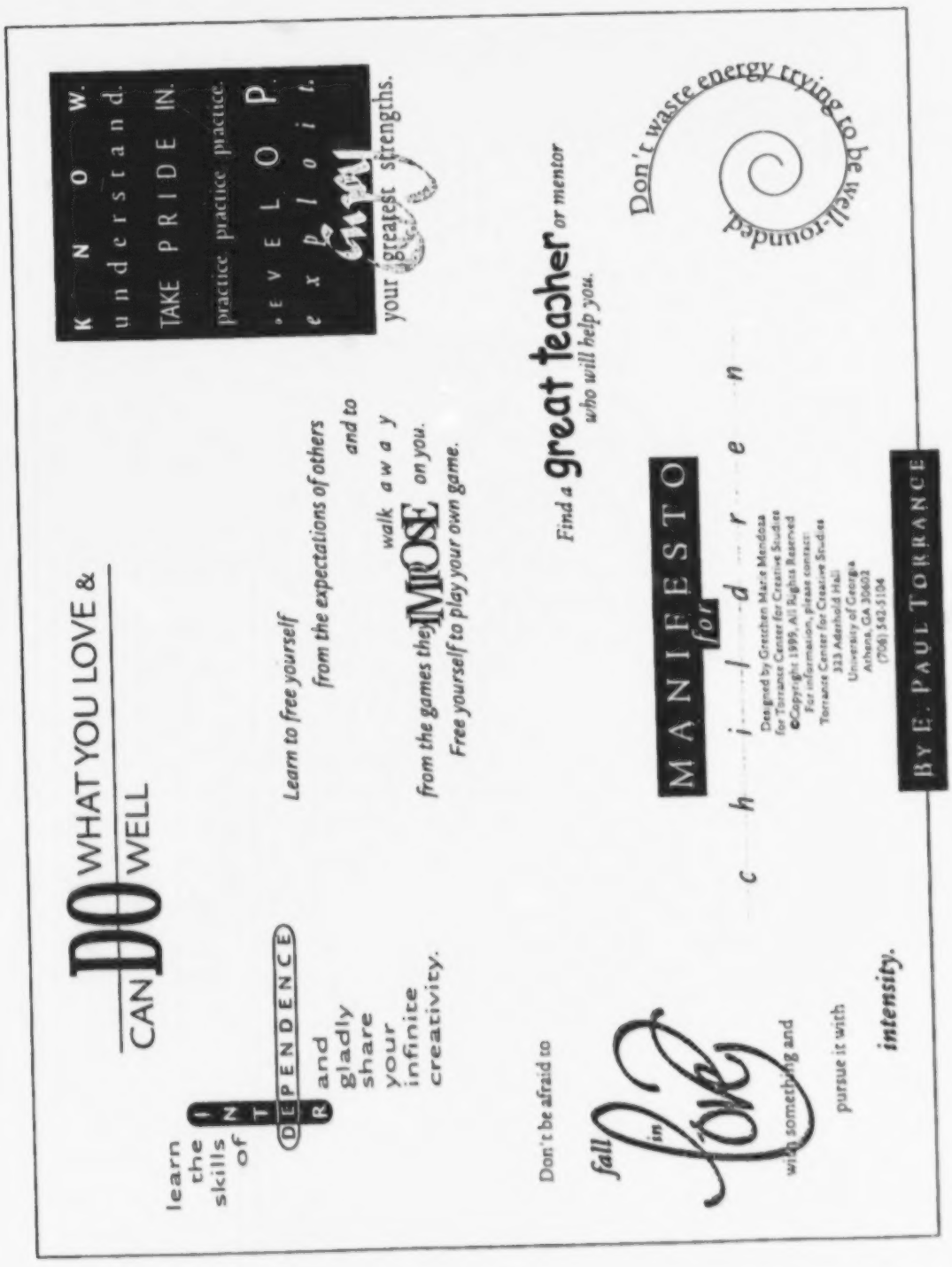

CAN DO WHAT YOU LOVE & DO WELL
learn the skills of INDEPENDENCE and gladly share your infinite creativity.
Learn to free yourself from the expectations of others and to walk away from the games they play. MOOSE on you. Free yourself to play your own game.
Don't be afraid to fall in Love with something and pursue it with intensity.
Find a great teacher or mentor who will help you.
MANIFESTO for Children
Designed by Gretchen Marie Mendoza for Torrance Center for Creative Studies
©Copyright 1999. All Rights Reserved
For information, please contact:
Torrance Center for Creative Studies
233 Aderhold Hall
University of Georgia
Athens, GA 30602
(706) 542-5104
BY E. PAUL TORRANCE
KNOW. understand. TAKE PRIDE IN. practice. practice. practice. DEVELOP. exploit. your greatest strengths.
Don't waste energy trying to be well-rounded

Figure 1. Manifesto for children.

BEST COPY AVAILABLE

To examine the differences between the most and least creative of the respondents, individuals were assigned to the High Creative Group if their number of public achievements was greater than or equal to 61 (n=27, 31% of the sample), and to the Low Creative Group if their number of public achievements was less than or equal to 22 (n=26, 31% of the sample). Additional analyses were then conducted on this sample of 53 respondents. A chi square analysis of gender by high vs. low quantity of public achievements was not significant. There were no differences in the proportion of males and females in the two quantity groups. A two-way ANOVA of quality, by gender by group (high vs. low creative) was statistically significant, $F(1.49)=9.53$, $p < .01$. The quality ratings for both males and females were significantly higher for the high quantity group. Finally, a Structural Equation Model was constructed, which explained about 23% of the variance in the factor of creative achievement showing both TTCT (composed of the three components of fluency, flexibility, and originality) and IQ with significant paths to creative achievement with fit indices shown as Z^2 ($p = .21$), RMSEA = 0.067, which was in the range of reasonably good fit, AGFI = .90. The path from the TTCT to creative achievement was shown to be statistically different from zero, evidence of a true effect of test performance on creative achievement. Likewise, the other two paths from IQ to TTCT, and from IQ to creative achievement were also significant (see Cramond et al., 2001).

The data collected in the latest follow-up is still being analyzed both quantitatively and qualitatively. The open-ended responses are being analyzed, and several of the participants have agreed to interviews. Future reports on these data collection will include some of these findings.

Conclusions From Longitudinal Studies

The results of the longitudinal studies provide evidence of the validity of the TTCT, and to a lesser extent, IQ for predicting adult creative achievement. Overall, the correlation coefficients may be considered of moderate magnitude for the social sciences (Cohen, 1988). However, in interpreting these analyses, one must take into account that these correlations were obtained after a 7 to 40 year time lapse, and by correlating pencil and paper measures with real-life accomplishments.

However, it is very clear that there are many additional factors that can help or hinder this success. As in other longitudinal studies with highly intelligent and talented individuals (Bloom, 1985; Terman & Oden, 1959), Torrance's longitudinal studies point out the critical role that personality, environmental situations, and luck play in the development of the productive individual.

The Future Problem Solving Program

While conducting his creativity research at the University of Georgia in Athens, Torrance began to grow concerned about the overall decline of creativity in American society, as well as the lack of knowledge and concern for the future among young people in this country. In 1974, when he was invited to work with a group of gifted students at a local high school, he took advantage of the invitation to field test an idea that he thought might address both problems. Torrance's idea was inspired from the work of Alex Osborn and Sidney Parnes, the originators of the Creative Problem Solving Process (CPS). He admired the simplicity of their process (Esser, 1994) and decided to teach it to this group of high school students to determine if they might learn to think more creatively. Torrance's idea was to combine this process with particular problems that addressed the future. By combining Creative Problem Solving with futuristic problems, Torrance hoped that young people would learn to think more creatively, while also developing an interest and concern

for the future. Hence, the original Future Problem Solving Bowl was held in Athens, Georgia (Treffinger, Jackson, & Jensen, 1996).

In response to their experiences working with Torrance and his graduates on Future Problem Solving (FPS), the high school student participants were enthusiastic and wanted to do more of these activities. A second set of materials was developed for the next school year and soon other schools throughout the state learned of the material and joined the program. Dr. Torrance's graduate students worked with him as their mentor. They helped to support the new program and eventually transferred the concept with them when they earned their degrees and began new professional positions throughout the country. With the dispersion of Torrance's graduates to various regions of the United States, the Future Problem Solving Program expanded.

In 1976-77, the FPS Bowl became the Future Problem Solving Program, a year-long program consisting of three practice problems given to students in October, November, and February. A scenario writing contest also took place in January. The competition was conducted in April with 10 teams at each the elementary, middle, and high school levels competing. By this time, the program offered teams feedback on the monthly practice problems and awarded certificates of merit for excellence. Within a few years, the Future Problem Solving Program was recognized nationally as both an interscholastic competition and a curriculum project designed to teach creative problem solving and future studies (Millar, 1995).

By 1979, the National FPS Bowl had expanded in breadth, depth, and size. Although only Georgia, Iowa, and Louisiana had formal state programs, students from 26 different states participated in the competition. The events of the Bowl also included a scenario writing contest, individual competition, and presentation competition in which teams designed skits to sell their best problem solving solutions (Treffinger, Jackson, & Jensen, 1996). While students were immersed in problem solving events, workshops, seminars, and social events were provided for students, coaches, and parents. In the mid 1980s, the number of state Future Problem Solving Programs reached 29. The Community Problem Solving Division was added in 1983-84, and the following year, the Primary Division was created. By 1988 the number of officially sanctioned programs had reached 38, and with the addition of the Australia-New Zealand FPS, Torrance's original idea field tested in Athens, Georgia had truly become international.

The mission of the Future Problem Solving Program is to design and champion optimistic futures through the use of creative problem solving. The following goals of the Future Problem Solving Program (www.fpsp.org) serve as the overarching objectives for educators implementing the program:

- Increase creative thinking abilities
- Improve analytical thinking skills
- Stimulate an interactive interest in the future
- Extend perceptions of the real world
- Explore complex societal issues
- Refine written, verbal, and technical communication skills
- Promote research
- Integrate problem solving into the curriculum
- Encourage cooperative, responsible group membership
- Offer authentic assessment

The FPS program involves young people applying a six-step problem solving process to analyze a present-day issue or dilemma from the perspective of the future. The

six-step FPS model involves the following: (a) Identify challenges in the Future Scene, (b) Determine the underlying problem, (c) Produce solution ideas to the underlying problem, (d) Generate and select criteria to evaluate solution ideas, (e) Evaluate solution ideas and determine the better action plan, and (f) Develop an action plan.

Five problem topics are used as the focus for the FPS program during a school year. In teams of four, students select one of the five problems and are then presented a futuristic scenario or "Fuzzy Situation" based on the problem they have chosen. They are required to identify a set of 20 problems that might be a cause or effect of the problem being examined. The team must consider the possible changes which might occur in the future within a wide range of areas such as technology, communication, government, and politics. Students also must take into consideration moral, ethical, and religious concerns associated with the problem. From their list of 20 problems, one problem is then selected as the "underlying problem," a problem that, if solved, will have a major influence on the Fuzzy Situation. Students are then required to generate a list of twenty solutions to their underlying problem, generate criteria for evaluating these solutions, and use an evaluation grid to select the one solution the team thinks will best solve their underlying problem. As a final step in the FPS process, the team members write an elaborate explanation of their best solution and design a plan for its implementation (Esser, 1994).

Currently, the Future Problem Solving Program offers four problem-solving components: Team Problem Solving, Community Problem Solving (CmPS), Scenario Writing, and Action-based Problem Solving. In Team Problem Solving, the original component of FPS, collaborative teams are presented with an imagined future scene, and they must research issues and apply the six-step FPS process to tackle social, scientific, political, economic, or technological problems. CmPS focuses on authentic problems with students implementing the FPS problem solving model to address local issues in their communities. CmPS teams choose a community problem solving project from health or environmental concerns, human services, and civic and cultural issues. In Scenario Writing, creative writers polish their writing skills in crafting futuristic short stories based on one of the annual five FPSP topics. Action-based Problem Solving is a year-long noncompetitive problem solving program designed for the regular classroom in which youngsters are introduced to creative problem solving strategies that can assist students in investigating authentic concerns in their local community and taking positive action (www.fpsp.org).

Today, the Future Problem Solving Program continues to grow. According to the FPSP International Office, there are 41 FPSP affiliate programs in the United States, Australia, and New Zealand, with over 250,000 students participating in FPS activities. Each year, over 2000 students attend the International FPS conference, which includes four days of competitive problem solving, cooperative educational seminars, and social activities (Hume, 2001). As the program continues to expand, more and more students have the opportunity to develop their creative thinking skills to solve problems salient to their lives currently, as well as those that may become salient in the future.

The Incubation Model of Teaching

The Incubation Model of Teaching can be used with both gifted and talented children, as well as all children in a regular classroom. All children's inherent curiosity motivates them to think about what they have learned, to delve into the topic by asking questions and experimenting and ultimately using what they have learned (Torrance & Sisk, 1997).

Torrance conceptualized the Incubation Model in 1966 when Ginn and Company asked him to serve as a creativity consultant in reading and social science. In that capacity

Torrance was asked to prepare guidelines for the authors to develop instructional materials and learning activities for teachers. To accomplish this goal, Torrance believed that two kinds of information were necessary: information about the creativity skill levels expected of children at different ages and the types of activities that would facilitate creative thinking—preceding, during, and following a lesson. Torrance and Sisk (1997) summarized the goals of the Incubation Model of Teaching as follows:

> Before creative thinking can occur, something has to be done to heighten anticipation and expectation and to prepare learners to see clear connections between what they are expected to learn and their future life (the next minute or hour, the next day, the next year, or 25 years from now). After this arousal, it is necessary to help students dig into the problem, acquire more information, encounter the unexpected, and continue deepening expectations. Finally, there must be practice in doing something with the new information, immediately or later. (p. 91)

The Incubation Model consists of three interactive, yet sequential stages: Heightening Anticipation (stage 1); Deepening Expectations (stage 2); and Keeping it going (stage 3), each incorporating a menu of classroom strategies for educators to select from in designing their lesson plans according to the model. Figure 2 provides an overview of the entire model. Following is a detailed description of each of the stages in the Incubation Model of Teaching.

Stage 1: Heightening anticipation. Torrance (1994) believed that learners must "warm-up" in their preparation for creative activities, just as a sports figure or actor or dancer would do in physical exercise. The warm-up consists of a variety of different exercises to initiate the creative process, including physical, mental, and social activities. Drawing on the work of Lazanov (1977) and Moreno (1946, 1952), Torrance believed these activities would serve to create the desire to know; heighten anticipation and expectation; get attention; arouse curiosity; tickle the imagination; and give purpose and motivation (Torrance & Safter, 1990). These activities should prepare children for the lesson to follow. For example, a warm-up activity may result in students' awareness of a problem to be solved, provoke questioning to make students think of information in new ways, or stimulate students' curiosity and desire to know more (Torrance & Safter, 1990).

Stage 2: Deepening Expectations. After warm-up, Torrance insisted that the process must not only be sustained, but heightened even more. To accomplish this and deepen the creative experience, Torrance and Safter (1990) suggested eight different information processing strategies. In the first strategy, "digging deeper," students are encouraged to move beyond the surface level description of a topic and find what is hidden or unexplored. Students diagnose difficulties, integrate the information available, verify it against their initial hypotheses, and synthesize different types of information by elaborating and diversifying. The second strategy, "looking twice," is a multi-exposure approach in which information is presented, evaluated, and re-evaluated with new associations.

Torrance used the analogy of "listening for smells" to describe the third pattern of information processing. This strategy incorporates the use of one or more of the five senses—moving, visualizing, imagining sounds, making sounds, smelling, and feeling textures (Torrance & Safter, 1990). Another strategy, "listening/talking to a cat or crossing out mistakes," requires the learners to interact with the material. Students should make guesses, check, correct, modify, reexamine, refine, discard irrelevant facts or inadequate solutions, and improve solutions (Torrance & Safter, 1990).

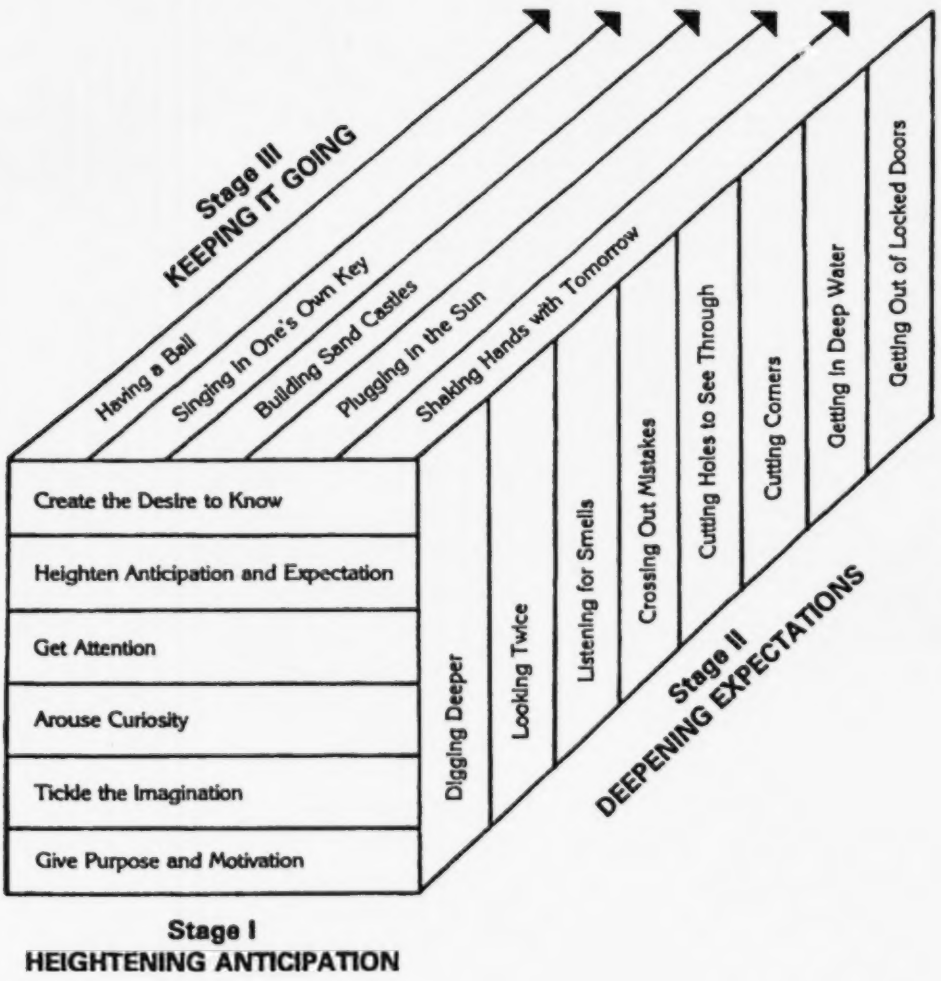


Figure 2. The Incubation Model of Teaching: Getting beyond the aha!

A fifth strategy, "cutting holes to see through," requires students to focus on important information, targeting specific information, and discarding the unneeded. In the sixth information processing strategy, "cutting corners," students make new mental leaps to new insights helpful in defining and solving problems. In the strategy "getting in deep water," students become deeply engaged in the complexities of the topic. They may focus on aspects previously not confronted or even considered by others. Torrance and Safter described the final strategy, "getting out of locked doors" as solving what seem to be unsolvable problems. Some methods for tapping into the different types of information processing described above include visualization, juxtaposition of irrelevant information, and open-endedness.

Stage 3: Keeping it going. Torrance (1994) saw the third stage of his model as going "beyond the classroom, textbook, and the teacher" (p. 228). Engaging in some creative behavior, the student would continue to keep the learning process active. Torrance

and Safter (1990) presented several information processing techniques for the student to "keep it going." One strategy, labeled "having a ball," centers on the importance of using humor and fantasy in teaching to keep students engaged in the continued process of learning. "Singing in one's own key," another strategy, involves helping students make the information salient to their own lives by connecting personal experiences to the information and using it to solve personal problems. A third strategy, "building sand castles," involves the search for the perfect solution or ideal situation by beginning with the information provided and building hypotheticals and ideals. Another strategy, "plugging in the sun," describes the need for students to tap into new resources to seek the information they may need. The final strategy, "shaking hands with tomorrow," requires students to use the information they have acquired to propose a solution to a future problem. Some of the activities suggested to accomplish all of these techniques are looking at future projections, improbabilities, and different manipulations of ideas or objects (Torrance & Safter, 1990).

The Incubation Model of Teaching may be used as a guide in planning courses, planning lessons, developing instructional materials, and in making instruction more effective (Torrance & Sisk, 1997). According to Torrance and Safter,

> No longer should incubation and getting beyond "aha" be regarded as a regressive thought process or as a chance matter. It should be regarded as a higher level thought process that goes beyond logical, rational processes, and one that can be enhanced through practice and instruction . . . . (1999, p. 126)

E. Paul Torrance: His Legacy

The Torrance Center for Creative Studies

Paul Torrance's career of distinction was recognized by his colleagues and the University of Georgia during the 1983-1984 academic year with the establishment of the Torrance Center for Gifted, Creative, and Future Studies. Dr. Mary Frasier, who joined Dr. Torrance in the Gifted and Creative Education Program in the Department of Educational Psychology, first proposed the idea for the Center to continue the legacy of Dr. Torrance. In 1982, Dr. Frasier realized that E. Paul Torrance would soon be retiring, and she wanted to recognize Torrance's contributions to education. She developed a proposal to create a center in Paul Torrance's name at UGA. With Dr. Frasier as the director, The Torrance Studies of Gifted, Creative, and Future Behaviors was established in 1983 and later renamed the Torrance Center for Creative Studies.

Dr. Frasier described the Torrance Center as a place where Dr. Torrance's work continues to live. The objectives center on the mission of the University of Georgia: to research, to instruct, and to serve. The Torrance Center sponsors the FPS program, as well as the Challenge Program, a Saturday and summer enrichment program for elementary and middle school students. In addition, the Center also serves as a place to house Dr. Torrance's papers making them accessible to students and creativity researchers. The Visiting Scholars Program was developed through the Center to encourage research by national and international scholars on creativity. Individuals from many countries throughout the world continue to come to the Torrance Center to study or conduct creativity research. The Torrance Center also sponsors the Annual E. Paul Torrance Lecture, featuring a person of national or international reputation who addresses topics associated with gifted education and creativity.

Currently, the Torrance Center remains active, supporting these programs and carrying out the legacy of E. Paul Torrance. Dr. Russell Yeaney, former Dean of the College of Education at the University of Georgia, summarized the significance of the Torrance Center for Creative Studies in the forward of Dr. Torrance's book entitled *On the Edge and Keeping on the Edge*:

> At the University of Georgia, Paul Torrance and our efforts to study and promote creative behaviors are firmly and forever linked. The Torrance Center and the Annual Lecture are symbols of the commitment that the university has to further the lifelong work of Dr. Torrance. He presented us with the notion of creative thought, pursued the notion himself in many studies, and instilled in hundreds of students and colleagues a desire to more fully understand and implement his ideas. Truly, Paul Torrance emerged as a seminal scholar in the field, a scholar who engaged a body of students to understand and broaden his ideas. The Torrance Center continues to provide a base for these efforts, a place to implement, test, and refine the theories and thoughts of a well-respected colleague, mentor and benefactor. (Torrance, 2001b, p. vii)

Torrance's Legacy Continues Through his Students

E. Paul Torrance is a brilliant scholar and researcher, yet perhaps what he is remembered for best by those who worked with him is the strong mentoring he provided. Despite his great achievements and emerging reputation as an international scholar, Torrance always maintained a sense of humility, treating his students with respect and taking time to nurture their development as a mentor. As a former doctoral student of Dr. Torrance's, Dr. Jeanette Parker of the University of Louisiana at Lafayette reflected on her relationship with him, saying

> He was my mentor in every sense of the word. He has had a great influence on my life. One of the most memorable things I recall is going into his office one day, needing to see him, and apologizing for interrupting him and having him say, "Jeanette, you'll never find me not busy, but I'll never be too busy to help you." and I always remembered that and learned a great deal from it.

Rod Myers, another former doctoral student of Torrance's, also reflected on Dr. Torrance's care and consideration of his students. Myers believes ". . . the greatest thing about Dr. Torrance is the positive valuing of his students." Reflecting on his experiences with Dr. Torrance as a professor, Myers commented, "As an instructor he was open-minded, valuing, and respectful of your talents, encouraging, and understanding. Anything you'd like to have in a teacher, that was Dr. Torrance."

Bonnie Cramond also commented on the personal relationship Dr. Torrance sought to develop with each of his students. According to Cramond, he made a point to learn and keep abreast of each of his student's research interests. Cramond reflected on his process of developing relationships with his students:

> On the first day of class he would take a picture of each student and he would start a file on each student. I found out years later that every note I had given him, any letter I had written him, anything he had on me went into that file. So he remembered all of his students, and throughout their lives, kept in touch with them.

Cramond also commented on Torrance's diligence in responding to his students' questions. Long after class had ended, Torrance would follow through on addressing their

concerns, locating information and resources for them. Cramond reflected on her experiences as his student:

> While I was a student, I was really impressed by the fact that if I asked him a question, he would say, if he didn't have the answer right away, he'd say "I'll get back to you on it." And the next day, there would be a type written note in my mailbox with the references, information, everything. I was always so impressed that he would take time out of his extraordinarily busy schedule to type me a note and find whatever it was that I was interested in. He acted like you were important, even when you were a student, one of thirty in the class.

In addition to the respect and support he demonstrated for his graduate students, Torrance is also well-known for his desire to disseminate information on creativity to as many people as possible. According to a former student, Vicki Connell,

> In his career, all of his efforts were directed toward getting his message out to the largest number of people. For example, he wanted Future Problem Solving to be in the hands of every student. He wanted creativity to be in every classroom. He wanted every teacher to have access to the materials and information.

Torrance was willing to share his knowledge and resources with anyone seeking his advice on creativity. As a prolific scholar, Torrance's work was widely received, resulting in countless letters each day requesting resources, materials, or advice on issues related to creativity. He remains dedicated to the dissemination of knowledge to others, despite the volume of requests he received. Connell further elaborated:

> He gets a lot of general letters which are the kinds of things "send me everything you have on creativity." Of course, he has rooms and rooms full of things on creativity. So he very carefully selects the appropriate articles and photocopies those, packages them and mails them at his own expense. Very seldom does he let two days go by between the receipt of a letter and his response. I would say his greatest strength is his generosity combined with that sense of mission.

Dr. Tammy Safter, a doctoral student of Dr. Torrance who later co-authored *Making the Creative Leap Beyond*, reflected poignantly on her relationship with Torrance and the mentoring style he used with so many of his students:

> When we worked together, I would talk, wonder, ask for his opinion. He would sit back, smile, ask me a few more questions—ones that caused me to come up with the answers I had been looking for from him—I would express that, and he would smile. Sometimes he would just say a few words, and it would send me into another whole new direction, one I had not thought of before. He was marvelous at helping me to feel comfortable with the quality of my own insights. He has a quality of being able to give other people what they need, so that they can find the creativity within themselves to pursue their own inquiry. He is selfless in that regard.

As a result of the strong instruction, guidance, and mentoring they received under the direction of Dr. Torrance, many of his students have graduated and become well-known themselves for their work in creativity. Following is a select biography chronicling the achievements of 9 of Torrance's students and their influence on the field of creativity.

Walter Allen

Dr. Walter Allen earned his Doctorate under the direction of Paul Torrance at the University of Georgia in 1973. Dr. Allen was an educator in Athens, Georgia for 33 years, serving as band director, music teacher, and administrator. He also served as an adjunct faculty member at the University of Georgia in Educational Psychology for 7 years. Dr. Allen spent 2 years at the Medical College of Georgia as an Associate Director of the Sickle Cell Center in Augusta, Georgia. Dr. Allen served as Executive Director of Action, Inc., and taught in Africa at the United States International University in Nairobi. Presently, he is a full professor of music and psychology at Truett McConnell College. Dr. Allen has received the Martin Luther King Award for promoting social change, the NAACP Leadership Award, and an award from the Governor of Georgia for his work as a social activist in the prison system.

Robert Alan Black

Dr. Robert Black earned his doctorate in 1983 with an emphasis in creativity following masters degrees in guidance and counseling and art. Dr. Black specializes in teaching S.P.R.E.A.D.ng (Supporting, Promoting, Recognizing, Encouraging, Applying, and Developing) of creative thinking through speeches, workshops, training programs, and retreats he has given both nationally and internationally. Dr. Black is currently a colleague of the Creative Problem Solving Institute (CPSI) and an active member of the Creative Education Foundation, American Creativity Association, the Innovation Network, and the National Center for Creativity, Inc. He is well known internationally for his dynamic creativity workshops, speeches, training programs and retreats. Dr. Black has authored 10 books, numerous training workbooks and over 200 published articles all focusing on the enhancement of creativity. Dr. Black's most recent book is entitled *Broken Crayons: Break Your Crayons and Draw Outside the Lines*.

Bonnie Cramond

Dr. Bonnie Cramond earned her Doctoral degree under the direction of Dr. Torrance and went on to design graduate degree programs in gifted education in both Louisiana and Illinois. In 1989, Dr. Cramond was recruited to return to her alma mater to continue her work in creativity research. Dr. Cramond is an Associate Professor of Gifted and Creative Education, a Research Fellow with the Torrance Center for Creative Studies and the Graduate Coordinator in the Department of Educational Psychology at the University of Georgia. In addition to publishing numerous articles and book chapters, Dr. Cramond has coauthored *Investigating Creativity in Youth: Research and Methods* with Anne Fishkin and Paula Olszewski-Kubilius. Dr. Cramond serves as an editor of the *Journal of Secondary Gifted Education*, and on the editorial board of several other gifted education journals. Her research in creativity assessment, ADHD, and the nurturance of creative abilities in children have led her to become a well established presenter at national and international conferences in gifted education and creativity research. She continues Torrance's work through collaborating with him in writing, publishing articles, and monographs extending his research, and continuing work with the Torrance Tests of Creative Thinking.

Dorothy Funk-Werblo

Dr. Dorothy Funk-Werblo earned both her Master's and Doctoral degree under the direction of Dr. Torrance. In her career, she has served in over 70 different positions, often holding several appointments at once, and taught in the public schools for over 40 years. She was the producer and designer for the two-time international award-winning

documentary *Gifted Children: Our Untapped Resource*. She has also won awards for art and magazine articles. Currently, Dr. Funk-Werblo is the International Gifted Child Program Coordinator for MENSA and serves on the MENSA national committees for gifted programs.

Kathy Goff

Dr. Kathy Goff earned her Doctorate in Educational Psychology at the University of Georgia under the direction of Dr. Torrance. Dr. Goff has served in faculty positions at Oklahoma State University and the University of Oklahoma Health Sciences Center, College of Medicine where she also served as a state-wide training director. During the same time she was teaching, Dr. Goff was actively involved in publishing numerous articles and books and conducting workshops in the field of creativity. Following her work in the field of education, Dr. Goff applied her skills in the business arena. She serves as President of McGoff Creativity, L. L. C., a creativity research, education, and inventing firm. In her capacity as a business consultant, Dr. Goff teaches creative and collaborative skills to individuals and cross-functional teams for a variety of progressive organizations.

Joe Khatena

Dr. Joe Khatena earned his Doctorate at the University of Georgia under the direction of Dr. Torrance. He is Professor Emeritus in the Department of Educational Psychology at Mississippi State University. Dr. Khatena has served as a visiting professor in several universities both in the United States and abroad. His interest in giftedness and creativity led to the development of numerous books including *The Creatively Gifted Child: Suggestions for Parents and Teachers, Educational Psychology of the Gifted, Imagery and Creative Imagination* and *Gifted: Challenge and Response for Education*. Dr. Khatena is a Fellow of the American Psychological Association and is past President of the National Association for Gifted Children. He is listed in 23 biographical works, including *Who's Who in Frontier Science and Technology, Who's Who in America*, and *The Encyclopedia of Special Education*. He is the recipient of several awards, including the National Association for Gifted Children Distinguished Scholar Award and Distinguished Service Award, the Distinguished Summer Lecturer Award of Texas Women's University, the Marshall University Research Award, a Phi Kappa Phi Research Award, and two Fullbright Lectureships to India.

Felice Kaufmann

Dr. Felice Kaufmann earned her Doctorate in educational psychology under the direction of Dr. Torrance. She pursued a career in academia as a professor. In this position, she created teacher training programs in gifted education at Auburn University and the University of New Orleans and University of Kentucky. She was also a visiting professor/distinguished scholar at several universities. Dr. Kaufmann has been on the board of directors of the National Association for Gifted Children, the Executive Board of The Association of the Gifted (TAG), and the National Conference on Governor's Schools. She also served as Director of the National Training Program in gifted education for the Council for Exceptional Children. She has presented workshops and keynote addresses and written research manuscripts, textbook chapters, and popular press articles on various topics in gifted education. Dr. Kaufmann has served on the editorial boards of various journals in gifted education. She is currently an independent consultant in gifted education. Included among Dr. Kaufmann's awards are the 1982 Leta Hollingworth Award, the 1985 MENSA Award for Excellence in Research, MENSA International, and the 1997 Certificate of Merit for Outstanding Service to the Field of Gifted Education by The Association for the Gifted, Council for Exceptional Children.

Rod Myers

Following a career in photography and teaching, Dr. Rod Myers earned a Doctorate from the University of Minnesota under Dr. Torrance. His association with Dr. Torrance led to a variety of experiences in the field of creative thinking. He began a career in academia as a professor and simultaneously launched a career as a writer and curriculum specialist, eventually settling in Oregon as a researcher, film maker, and curriculum specialist. In recent years, Dr. Myers has concentrated on writing curriculum materials that feature critical and creative thinking, at present totalling 25 books. His book, co-authored with Paul Torrance, entitled *Creative Learning and Teaching*, won an outstanding book award from Pi Lambda Theta. His film, *Feather*, won the Golden Eagle, Council on International Nontheatrical Events Award.

William Nash

Dr. Nash received his Doctorate from the University of Georgia under Dr. Torrance's guidance and joined the Educational Psychology Department faculty at Texas A&M University where he remains. He developed a graduate level concentration on studies of intelligence, creativity, and giftedness and currently teaches graduate courses in these areas. In 1980 he established the Institute for the Gifted and Talented that continues to sponsor summer programs for gifted teenagers and institutes for teachers of the gifted. His research grants totaled nearly a million dollars. He has published 17 articles in research journals, 3 book chapters, 1 monograph, and numerous newsletter articles and technical reports. He served as a visiting professor for the University of Georgia's Torrance Center for Creative Studies. He also served as Presidents of the National Association for Gifted Children and Chairman of the Charter Board of Directors of the American Creativity Association. He was honored with the Texas A&M University Former Students Association's Distinguished Faculty Achievement Award, the American Creativity Association Creative Leadership Award, and the Texas Association for the Gifted and Talented President's Award.

Koblus Neethling

Dr. Koblus Neethling holds six university degrees including a Doctorate from the University of Georgia in 1984. Dr. Neethling taught at two high schools before becoming a lecturer at a teachers' training college. He was then appointed the first Educational Planner for the Gifted in Africa in 1980. He also served as Deputy Director General of Communication and Special Creativity Advisor to the Minister of Police. As Founder and President of the South African Creativity Foundation, Dr. Neethling formed a company to specialize in the identification and development of creativity of all people in business, sport, community, and education—the most renowned creativity organization in Africa. He also mentored a number of athletic champions. Dr. Neethling has authored and coauthored more than 70 books and wrote 5 television series. He is included in 10 international *Who's Who* publications and was featured in *The Most Outstanding 2000 Scholars of the Twentieth Century*. Dr. Neethling also received the South African Best Speaker Award and the Leadership Award from the Creative Educational Foundation of Buffalo, New York.

Solange Wechsler

Dr. Solange Wechsler has been a psychologist at the Pontifical Catholic University of Rio de Janeiro, Brazil since 1974. She earned her Master's and Doctoral degrees in school psychometry and school psychology from the University of Georgia. She is the founder of the Brazilian School and Educational Psychological Association and the Laboratory for Research on Psychological Assessment. She is a member of the National

Commission for Psychological Assessment, Vice-Director of the National Institute for Research on Psychological Assessment and Director of the National Center for Creativity and Human Development. Dr. Wechsler was named to the Executive Board of the Iberoamerican Association for Psychological Assessment and has been an invited professor and lecturer in many countries in South America, North America, and Europe. She has published more than 80 papers and book chapters related to identification and development of creativity, school psychology, and psychological assessment. Her present research interests include the assessment of multiple intelligences and the identification and mentoring gifted and creative children from economically disadvantaged backgrounds.

Conclusion

E. Paul Torrance's life, accomplishments, and legacy give testimony to his eminence as a mentor, teacher, and scholar. Since his retirement, he has continued to remain prolific, authoring several new books on creativity, including the following: *Why Fly? A Philosophy of Creativity, Creative Problem Solving through Role-Playing* (with Murdock and Fletcher), *Gifted and Talented Children in the Regular Classroom* (with Sisk), *Making the Creative Leap Beyond* (with Safter), *and Multi-Cultural Mentoring of the Gifted and Talented* (with Goff and Satterfield). Torrance's continued dedication to the field of creativity was perhaps best summarized by the late A. Harry Passow, who stated "There are few names in education who have had as much influence nationally and internationally as my friend and colleague, E. Paul Torrance."

References

Ball, O. E., & Torrance, E. P. (1984). *Streamlines scoring workbook: Figural A.* Bensenville, IL: Scholastic Testing Service.

Barron, F. (1957). The psychology of imagination. *Scientific American, 199,* 151-166.

Bloom, B. S. (Ed.). (1985). *Developing talent in young people.* New York: Ballatine.

Broadley, M. (1943). *Square peg in square holes.* Garden City, NY: Doubleday, Doran.

Cohen, J. (1988). *Statistical power analysis for behavioral sciences.* Hillsdale, NJ: Erlbaum.

Cramond, B. (1994). The Torrance Tests of Creative Thinking: From creation through establishment of predictive validity. In R. F. Subotnik & K. D. Arnold (Eds.), *Beyond Terman: Longitudinal studies in contemporary education* (pp. 229-254). Norwood, NJ: Ablex.

Cramond, B., Matthews-Morgan, J., Torrance, E. P., Zuo, L., Zi, F., & Long, L. (2001). *The 40 year follow-up on the Torrance Tests of Creative Thinking.* Manuscript submitted for publication.

Cropley, A. J. (1971). Some Canadian creativity research. *Journal of Research and Development in Education, 4*(3), 113-115.

Esser, D. M. (1994). Twenty years of Future Problem Solving. *Gifted Education Press Quarterly, 8*(4), 8-11.

Feldman, D. H. (1988). Creativity: Dreams, insights, and transformations. In R. J. Sternberg (Ed.), *The nature of creativity* (pp. 271-297). New York: Cambridge University Press.

Flanagan, J. C. (1957). *Flanagan classification test 16A, Ingenuity.* Chicago: Science Research Associates.

Future Problem Solving Program. (2001, July 7). *Opening doors to the future.* Retrieved from http://www.fpsp.org

Frasier, M. M. (1990, May). *Torrance verbal and figural tests: Measuring general creative thinking processes.* Paper presented at the annual AERA meeting, San Francisco, CA.

Goff, K., & Torrance, E. P. (2000). *Brief demonstrator form of the Torrance Tests of Creative Thinking.* Chicago: Scholastic Publishing.

Guilford, J. P. (1956). Structure of intellect. *Psychological Review, 53,* 267-293.

Henderson, M., Presbury, J., & Torrance, E. P. (1983). *Manifesto for children.* Staunton, VA: Full Circle Counseling.

Hume, K. (2001, March). The Future Problem Solving Program. *Parenting for High Potential,* 8-11.

Lozanov, G. (1977). *Suggestology and outlines of suggestopedy*. New York: Gordon and Breach.

Millar, G. W. (1995). *E. Paul Torrance: "The creativity man."* Norwood, NJ: Ablex.

Moreno, J. L. (1946). *Psychodrama. First volume*. Beacon, NY: Beacon House.

Moreno, J. L. (1952). Psychodramatic production techniques. *Group Psychotherapy, 4*, 243-273.

Terman, L. M., & Oden, M. H. (1959). *Genetic studies of genius (Vol. 4). The gifted group at midlife: Thirty-five years' follow-up of a superior group*. Stanford, CA: Stanford University Press.

Torrance, E. P. (1954a, May 31). Portrait of an ace. *Time Magazine*, p. 38.

Torrance, E. P. (1954b). *The development of a preliminary Life Experience Inventory for the study of fighter interceptor pilot combat effectiveness*. San Antonio, TX: Air Force Personnel and Training Research Center, Lackland AFB.

Torrance, E. P. (1959, 1963, 1985). *Creative Motivation Scale: Norms technical manual*. Athens, GA: Georgia Studies of Creative Behavior.

Torrance, E. P. (1966). *Torrance Tests of Creative Thinking: Norms technical manual* (Research Edition). Princeton, NJ: Personnel Press.

Torrance, E. P. (1968). A longitudinal examination of the fourth grade slump in creativity. *Gifted Child Quarterly, 12*, 195-199.

Torrance, E. P. (1969a). Prediction of adult creative achievement among high school seniors. *Gifted Child Quarterly, 13*, 223-229.

Torrance, E. P. (1969b). It's time you learned to eat peas with a fork! *Theory into Practice, 8*, 332-333.

Torrance, E. P. (1972a). Career patterns and peak creative achievements of creative high school students twelve years later. *Gifted Child Quarterly, 16*, 75-88.

Torrance, E. P. (1972b). Predictive validity of the *Torrance Tests of Creative Thinking*. *Journal of Creative Behavior, 6*, 236-252.

Torrance, E. P. (1974). *Norms-technical manual: Torrance Tests of Creative Thinking*. Lexington, MA: Ginn and Company.

Torrance, E. P. (1979). *The search for Satori and creativity*. New York: Creative Education Foundation.

Torrance, E. P. (1980). Growing up creatively gifted: A 22-year longitudinal study. *Creative Child and Adult Quarterly, 5*, 148-158, 170.

Torrance, E. P. (1981a). Predicting the creativity of elementary school children (1958-80) - and the teacher who "made a difference." *Gifted Child Quarterly, 25*, 55-62.

Torrance, E. P. (1981b). Empirical validation of criterion-referenced indicators of creative ability through a longitudinal study. *Creative Child and Adult Quarterly, 6*, 136-140.

Torrance, E. P. (1994). *Creativity: Just wanting to know*. Pretoria, Republic of South Africa: Benedic Books.

Torrance, E. P. (2001a). *Experiences in developing creativity measures: Insights, discoveries, decisions*. Manuscript submitted for publication.

Torrance, E. P. (Ed.). (2001b). *On the edge and keeping on the edge: The University of Georgia annual lectures on creativity*. Westport, CT: Ablex.

Torrance, E. P., Bruch, C. B., & Torrance, J. P. (1976). Interscholastic futuristic creative problem-solving. *Journal of Creative Behavior, 10*, 117-125.

Torrance, E. P., & DeYoung, K. (1958). *Life experience inventory: Creativity form*. Minneapolis, MN: Bureau of Educational Research, University of Minnesota.

Torrance, E. P., & Safter, H. T. (1989). The long range predictive validity of the Just Suppose Test. *The Journal of Creative Behavior, 23*, 219-223.

Torrance, E. P., & Safter, H. T. (1990). *The Incubation Model: Getting beyond the aha!* Buffalo, NY: Bearly.

Torrance, E. P., & Safter, H. T. (1999). *Making the creative leap beyond*. Buffalo, NY: Creative Education Foundation Press.

Torrance, E. P., & Sisk, D. A. (1997). *Gifted and talented children in the regular classroom*. Buffalo, NY: Creative Education Foundation Press.

Torrance, E. P., Tan, C. A., & Allman, T. (1970). Verbal originality and teacher behavior: A predictive validity study. *Journal of Teacher Education, 21*, 335-341.

Treffinger, D. J., Jackson, J., & Jensen, B. (1996). *Future Problem Solving Program: Past, present, and future*. Ann Arbor, MI: Future Problem Solving Program.

Witt, G. (1971). The Life Enrichment Activity Program, Inc.: A continuing program for creative, disadvantaged children. *Journal of Research and Development in Education, 4*(3), 14-22.

Research Monograph

The National Research Center on the Gifted and Talented
University of Connecticut
2131 Hillside Road Unit 3007
Storrs, CT 06269-3007
www.gifted.uconn.edu

Editor
E. Jean Gubbins

Production Assistant
Siamak Vahidi

Reviewers
Kara Chauncey
Marion Rogalla
Carol L. Schlichter

Also of Interest

State Policies Regarding Education of the Gifted as Reflected in Legislation and Regulation
A. Harry Passow and Rose A. Rudnitski

Residential Schools of Mathematics and Science for Academically Talented Youth: An Analysis of Admission Programs
Fathi A. Jarwan and John F. Feldhusen

The Status of Programs for High Ability Students
Jeanne H. Purcell

Recognizing Talent: Cross-Case Study of Two High Potential Students With Cerebral Palsy
Colleen Willard-Holt

The Prism Metaphor: A New Paradigm for Reversing Underachievement
Susan M. Baum, Joseph S. Renzulli, and Thomas P. Hébert

Also of interest from the

Research Monograph Series

Attention Deficit Disorders and Gifted Students: What Do We Really Know?
Felice Kaufmann, M. Layne Kalbfleisch, and F. Xavier Castellanos

Gifted African American Male College Students: A Phenomenological Study
Fred A. Bonner, II

Counseling Gifted and Talented Students
Nicholas Colangelo

NRC G/T

The National Research Center on the Gifted and Talented Research Teams

University of Connecticut

Dr. Joseph S. Renzulli, Director
Dr. E. Jean Gubbins, Associate Director
Dr. Sally M. Reis, Associate Director
University of Connecticut
2131 Hillside Road Unit 3007
Storrs, CT 06269-3007
860-486-4676

Dr. Del Siegle

University of Virginia

Dr. Carolyn M. Callahan, Associate Director
Curry School of Education
University of Virginia
P.O. Box 400277
Charlottesville, VA 22904-4277
804-982-2849

Dr. Mary Landrum
Dr. Tonya Moon
Dr. Carol A. Tomlinson

Yale University

Dr. Robert J. Sternberg, Associate Director
Yale University
Center for the Psychology of Abilities, Competencies, and Expertise
340 Edwards Street, P.O. Box 208358
New Haven, CT 06520-8358

Dr. Elena L. Grigorenko

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

[X] This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

[ ] This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").